

Foreword



National
Oceanic and
Atmospheric
Administration



U.S.
DEPARTMENT
OF
COMMERCE

NOAA Fisheries Service Northeast Cooperative Research Partners Program

The National Marine Fisheries Service (NOAA Fisheries Service), Northeast Cooperative Research Partners Program (NCRPP) was initiated in 1999. The goals of this program are to enhance the data upon which fishery management decisions are made as well as to improve communication and collaboration among commercial fishery participants, scientists and fishery managers. NOAA Fisheries Service works in close collaboration with the New England Fishery Management Council's Research Steering Committee to set research priorities to meet management information needs.

Fishery management is, by nature, a multiple year endeavor which requires a time series of fishery dependent and independent information. Additionally, there are needs for immediate short-term biological, oceanographic, social, economic and habitat information to help resolve fishery management issues. Thus, the program established two avenues to pursue cooperative research through longer and short-term projects. First, short-term research projects are funded annually through competitive contracts. Second, three longer-term collaborative research projects were developed. These projects include: 1) a pilot study fleet (fishery dependent data); 2) a pilot industry based survey (fishery independent data); and 3) groundfish tagging (stock structure, movements and mixing, and biological data).

First, a number of short-term research projects have been developed to work primarily on commercial fishing gear modifications, improve selectivity of catch on directed species, reduce bycatch, and study habitat reactions to mobile and fixed fishing gear.

Second, two cooperative research fleets have been established to collect detailed fishery dependent and independent information from commercial fishing vessels. The original concept, developed by the Canadians, referred to these as "sentinel fleets". In the New England groundfish setting it is more appropriate to consider two industry research fleets. A pilot industry-based survey fleet (fishery independent) and a pilot commercial study fleet (fishery dependent) have been developed.

Additionally, extensive tagging programs are being conducted on a number of groundfish species to collect information on migrations and movements of fish, identify localized or subregional stocks, and collect biological and demographic information on these species.

For further information on the Cooperative Research Partners Programs please contact:

National Marine Fisheries Service (NOAA Fisheries Service)
Northeast Cooperative Research Partners Program

(978) 281-9276 – Northeast Regional Office of Cooperative Research
(401) 782-3323 – Northeast Fisheries Science Center, Cooperative Research Office, Narragansett
Laboratory

www.nero.noaa.gov/StateFedOff/coopresearch/

Final Report
Fall 2001 and Spring 2002
Maine – New Hampshire
Inshore
Trawl Survey

Submitted to the NOAA Fisheries-Northeast Region,
Cooperative Research Partners Initiative
(Contract 50-EANF-1-00013)

By
Sally A. Sherman, Vincent Manfredi, Jeanne Brown, Hannah Smith, and John Sowles
Maine Department of Marine Resources

Douglas E. Grout
New Hampshire Fish and Game Department

Donald W. Perkins, Jr.
Gulf of Maine Aquarium Development Corporation

And
Robert Tetrault
T/R Fish Inc.
F/V Tara Lynn and F/V Robert Michael

March 2003

TABLE OF CONTENTS

Acknowledgements	iii
Executive Summary	iv
Introduction	1
Materials and Methods	3
Results	10
Fall 2001 Summary	10
Spring 2002 Summary	11
July 2001 Special Survey Summary	12
August 2001 Special Survey Summary	15
Ichthyoplankton	16
Selected Species	17
Atlantic cod (<i>Gadus morhua</i>)	17
Haddock (<i>Melanogrammus aeglefinus</i>)	20
American plaice (<i>Hippoglossoides platessoides</i>)	23
Yellowtail flounder (<i>Limanda ferruginea</i>)	25
Winter flounder (<i>Pseudopleuronectes americanus</i>)	27
Goosefish (<i>Lophius americanus</i>)	30
Witch flounder (<i>Glyptocephalus cynoglossus</i>)	32
Atlantic herring (<i>Clupea harengus</i>)	34
Sea scallop (<i>Placopecten magellanicus</i>)	35
American lobster (<i>Homarus americanus</i>)	36
Discussion	39
Literature Cited	42
Appendix A: Individual Station Descriptions	A-1
Appendix B: Taxa List	B-1
Appendix C: Survey Catch Summaries	C-1
Appendix D: Policy on Release of Trawl Survey Data	D-1

ACKNOWLEDGEMENTS

Logistically, this was a complex project that benefited from the assistance of many people. Without their help, the survey could not have been completed. Forgive us for inevitably overlooking others who provided support.

We would like to thank Maine DMR staff that helped with mailings, car shuttles, and contributed to the data collection and entry. We appreciate the hard work put in by the commercial boat crews. F/V Robert Michael crewmembers Captain Sean Hayes, Captain Curt Rice, and Dale Pelletier and F/V Tara Lynn crew members Captain Sam Galli, Robert Woodward, Rob Tetrault, Jr., and Dale Doucette, all were most helpful, professional and enjoyable to work with. Lee Leavitt provided invaluable dockside assistance throughout the coast by transporting nets and parts to keep the survey running. Science crewmembers included Hannah Smith, Jessica Murray, Alison Sirois, Cheri Patterson, Mike Dionne, Brian Smith, Diane Kopek, Mark Szymanski, Arnie Carr, and Earl Meredith.

We are especially grateful for support from Colonel Joe Fessenden, Lieutenants Dan Morris, Dave Mercier, and Alan Talbot and some 20 Marine Patrol Officers who helped both on and off the water, handling gear, helping to communicate with lobstermen, and whose presence added to our security. We also very much appreciated NOAA National Weather Service's James Mansfield's and Mark Turner's assistance by broadcasting our schedule to mariners. We express many thanks to all of the facilities along the coast that provided dockage for the survey vessels. Alison Ferreira ably and successfully assisted us through our federal permitting process. Professor Yong Chen helped us conceptualize and refine our original sampling design. Terry Stockwell, Sarah Cotnoir, Linda Mercer, Carl Wilson, and Dan Schick helped with all aspects of the project providing technical guidance, field assistance, and general advice.

Lastly, we appreciate the support and cooperation of those fixed gear fishermen throughout the survey area who moved gear and suggested alternative sites when necessary. We also would like to thank those who participated in the survey as onboard observers; Brian Tarbox, Kelo Pinkham, Steve Train, Leroy Weed, Killer Smith, and Ken Kelley. The Lobster Zone Councils, Maine Lobster Advisory Council, Maine Lobstermen's Association, and Downeast Lobstermen's Association provided many comments, and suggestions to help improve the survey methods.

EXECUTIVE SUMMARY

This report summarizes the second year of a comprehensive bottom trawl survey of groundfish and other species for Maine-New Hampshire's inshore waters. This survey continues to develop the standards to be utilized for long term monitoring of the inshore waters of the Gulf of Maine. Funds set aside by Congress to assist groundfishermen were administered and distributed through the Cooperative Research Partners Initiative of the National Marine Fisheries Service with the goal of fostering research partnerships between commercial fishermen and scientists.

This survey is intended to compliment similar surveys conducted by the National Marine Fisheries Service in the outer waters of the Gulf of Maine and surveys conducted by other Atlantic coast states in their inshore waters. Prior to this survey, no fishery independent information has been available for approximately 80% of the U.S. Gulf of Maine's inshore waters. This survey utilizes newly designed research nets and two commercial fishing vessels to complete 100 trawls twice yearly for a total of 50 days at sea.

This report highlights findings of the second year and discusses comparisons with the pilot year. In-depth analysis of only two years of data is premature. In fact, it will be several years before a time series will be developed to use in stock assessment models. Additional information will be provided on several supplemental cruises as well.

Trawl survey data has a wide array of uses beyond groundfish stock assessments. In truth, this is a multispecies survey that provides broad information on finfish and invertebrate populations and communities that can contribute to how we manage our marine environments.

INTRODUCTION

The Maine-New Hampshire inshore trawl survey is a collaborative partnership between commercial fishermen and researchers to assess inshore fish stocks along the Maine and New Hampshire coasts. The project was funded through the National Marine Fisheries Service's Cooperative Research Partners Initiative. Collaborative research enables fishermen to contribute their knowledge and experience toward the process of scientific data collection and ultimately to resource management decisions. It also strengthens the trust between fisherman and scientists.

Fishery-independent trawl surveys are a well-established and accepted method of developing relative abundance indices for fishery resources (Gosslein, 1969). They reflect changes in true abundances of fish populations whereas commercial fishing practices change in response to market demand, fish availability, and regulations. In addition, it is difficult to measure changes in fishing power over time as technological improvements in commercial trawls and fish detection gear are made. Abundance indices derived from research trawl surveys are largely free of these biases since research surveys attempt to maintain consistent efforts. Trawl surveys are synoptic investigations that provide comprehensive information on distribution and abundance of all types and sizes of organisms within towable survey areas. Knowledge of distribution and abundance of juvenile (pre-commercial) fish is critical to the study of recruitment and for predicting future abundance.

Information about population sizes, instantaneous recruitment and mortality rates, trends, and distributions is essential for effective management of any resource. Such knowledge is critical to understanding both the dynamics and the condition of that resource. The lack of survey data from large areas of the Gulf of Maine has led to significant gaps in information needed to assess current stock conditions and develop effective management strategies. This project continues last year's effort to monitor inshore fish stocks and fill the inshore information gap.

Surveying the inshore waters of Maine and New Hampshire has been a long-standing challenge. The rough terrain that characterizes the bottom of the nearshore areas of northern Gulf of Maine along with the great quantity of fixed gear in inshore waters limits the number of tows that can be made. Even today, the NMFS surveys very few stations nearshore (< 50 fm). Past efforts to survey fish stocks in the Gulf of Maine focused heavily on offshore areas. Spring and fall bottom trawl surveys for finfish resources have been conducted along the inshore and offshore continental shelf waters from Cape Hatteras, NC to Cape Cod, MA, including the offshore Gulf of Maine, by the NMFS since 1963. In contrast, New Hampshire and Maine inshore waters, which comprise the bulk of the known spawning and nursery areas for the Gulf of Maine, (Rich, 1929; Bigelow and Schroeder, 1953) have not been continuously sampled. A comparable time series does not exist for these areas. Figure 1 shows an example of relative coverage between the NMFS, Massachusetts, and Maine-New Hampshire surveys using tows conducted by each during the spring of 2001.

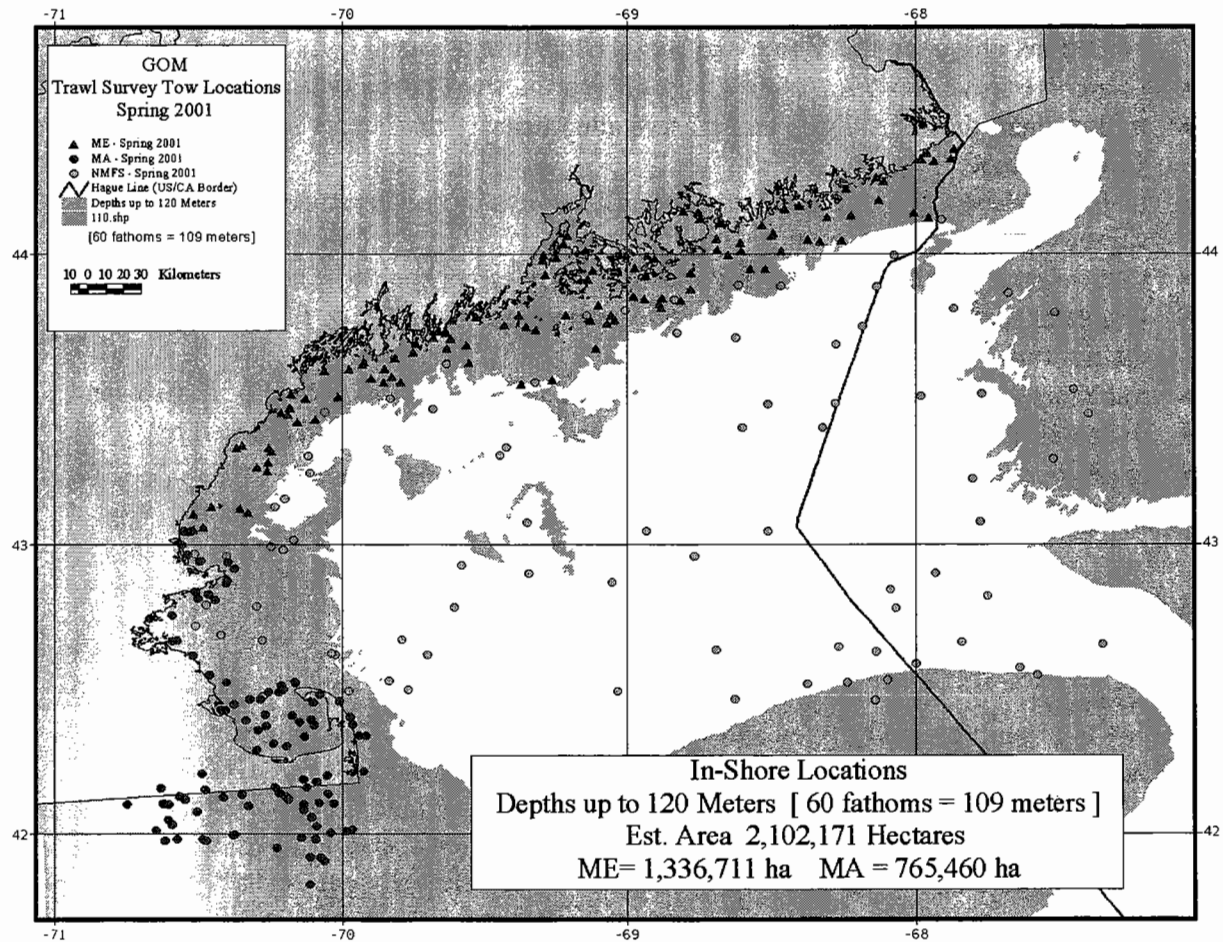


Figure 1. Map of stations locations for ME/NH, MA, and NMFS for the spring of 2001

The coverage this survey provides, as demonstrated in Figure 1, promises to be very valuable to the understanding of marine ecosystems in the Gulf of Maine. We are confident that the northern inshore Gulf of Maine can be successfully and consistently sampled via trawl survey indefinitely, with sustained funding.

Objective

The overall goal of this project is to establish a solid foundation for a long-term fishery independent monitoring program in Maine and New Hampshire's inshore waters (5-50⁺ fathoms) and to dispel any misinformation about the survey that still exists in the public at large.

Specific objectives are:

- to refine the inshore survey method developed in the first year, maintaining sound scientific methods while continuing to be flexible and practical under the cultural conditions unique to the Maine and New Hampshire coasts
- to involve fishermen from communities along the coast in scientific data collection
- to document the distribution and relative abundance of marine resources in the nearshore Gulf of Maine
- to evaluate the timing of the spring and fall surveys by conducting several smaller surveys throughout the year
- to develop recruitment indices for assessments of target species
- to collect environmental data, including temperature and salinity, that affect fish distribution
- to collect ichthyoplankton samples along the coasts to identify timing of finfish spawning
- to gather information on biological parameters (growth rates and reproduction)
- to provide an assessment of Maine's inshore spawning closure
- to assist refining Essential Fish Habitat (EFH) designations

MATERIALS AND METHODS

Sample Design

The survey is a combination of fixed and stratified random stations. The total survey area (~9,800 km², ~3,800 nm²) was stratified by depth and region. It includes three depth strata: 5-20 fathoms, 21-35 fathoms, and 36-50⁺ fathoms and five regions (Table 2, Figure 2) based on oceanographic, geologic, and biological features such as current speed, temperature, geomorphology, and biological communities. Where boundaries between regions coincidentally fell very close to common geo-political features such as headlands, municipal lines and Lobster Zone Management Council borders, the geopolitical boundary was used to facilitate mailings, announcements and meetings.

Table 2. Characteristics of the five regional strata.

<u>Region</u>	<u>Name</u>	<u>Dominating Characteristics:</u> Tidal Flow, Relative Temperature, Substrate
1	NH – So. ME	Slow, warm, sandy
2	Midcoast	Slow, warm, varied
3	Penobscot Bay	Slow, warm, varied and marked with high relief
4	Mt. Desert Is. Area	Fast, cold, hard with high relief
5	Downeast ME	Fast, cold, gravel

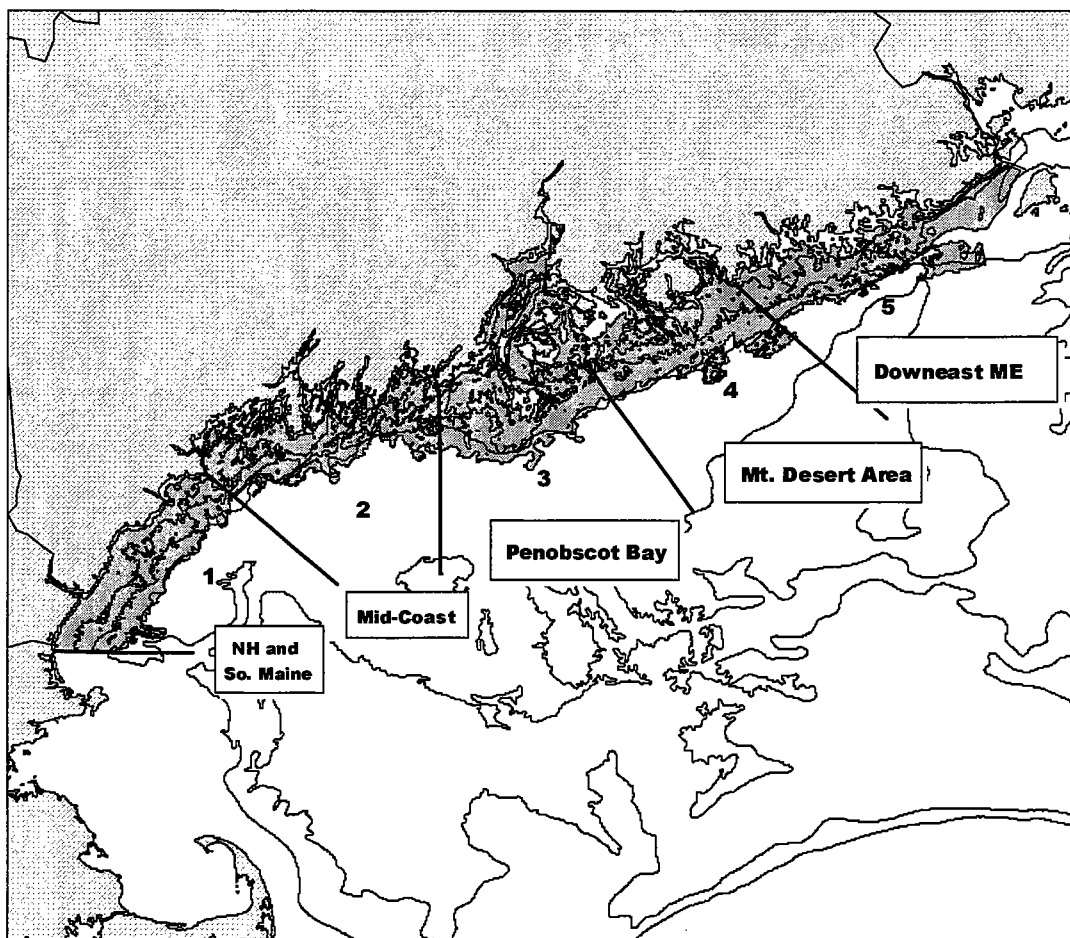


Figure 2. Displays the 15 strata as 5 regions with 3 depth strata

The shallowest depth was based on practical constraints imposed by the draft of a 54-ft dragger while the deeper boundary was selected to overlap the inner depths surveyed by the NMFS. We originally planned to also stratify the survey area according to bottom type. This would have resulted in only 2 tows per stratum and the undesirable statistical implications of reducing degrees of freedom to one. The third variable, substrate type, was therefore not used. The surface area of each stratum was then delineated using ArcView. To isolate inter-annual variation from variability introduced by a strictly random design, two fixed stations in each stratum were established after the first survey. One fixed station was chosen at random and the other selected to represent the 'average' catch for its stratum, based on previous data. The remaining stations were allocated in proportion to each stratum's area.

Each region was then divided into 1 nm² sampling grids (Figure 3) using ArcView. Large areas of the bottom that were known to be non-towable due to wrecks or "bad" bottom were eliminated from the random draw. To locate the stations, each grid within a region was sequentially numbered. Using an Excel random number generator (without replacement), the appropriate

number of grids was identified within each stratum. A target of 100 stations per survey was selected for sampling. If a grid did not appear to contain towable bottom, an alternate random grid was chosen. The final survey design resulted in a sampling density of about 1 station / 30 nm². This density compares to 1 station / 260 nm² in the NMFS survey (Azarovitz, 1994) and 1 station / 19 nm² in the Massachusetts survey (Correia, 1994).

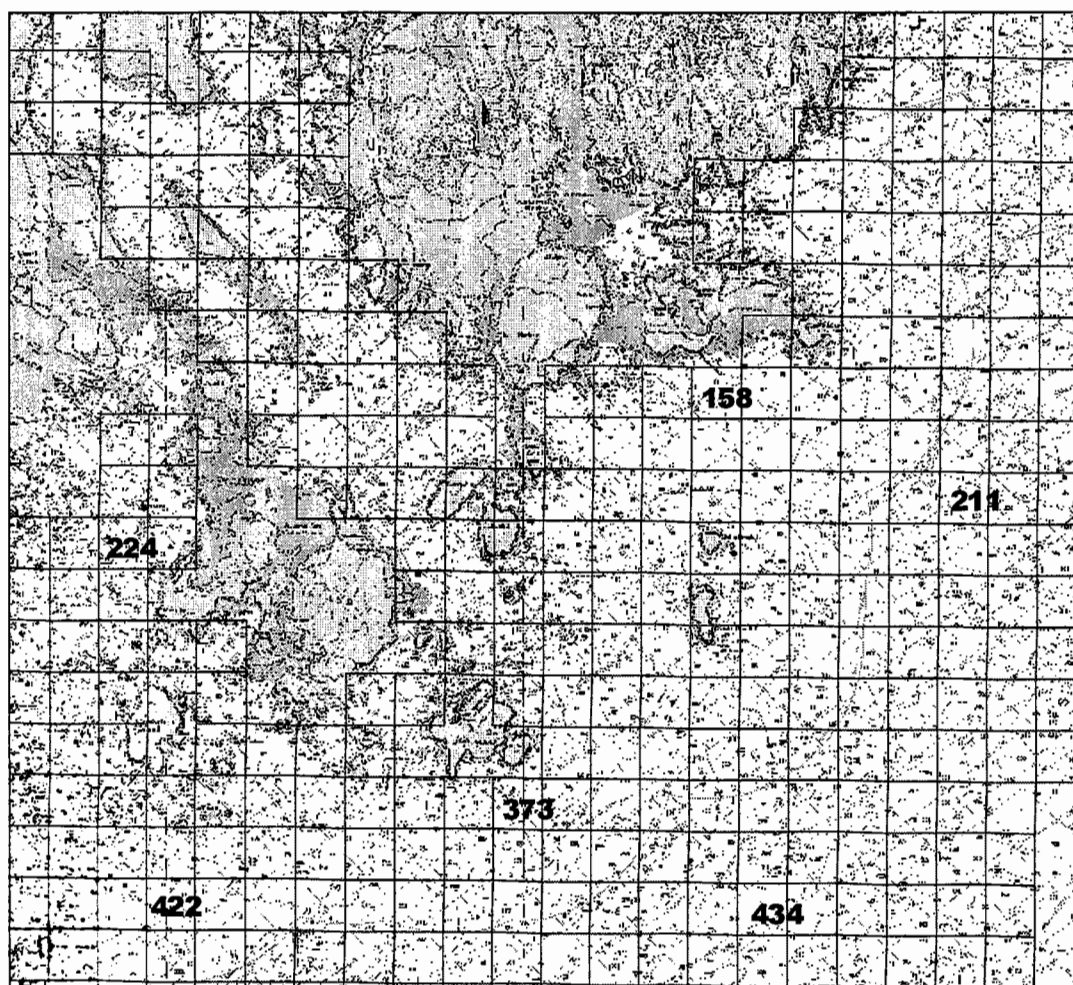


Figure 3. Example of 1 nm by 1 nm grid used to divide the coast into sample units that are assigned a unique number.

Once the appropriate number of grids within each stratum were selected, then the nearest towable bottom was identified and plotted on a chart, often with feedback from commercial fishermen (Figure 4). Proposed tows were drawn along Loran C lines when possible to facilitate fixed gear removal. Each tow was scheduled for a specific day on the cruise, weather permitting. These charts and the scheduled dates were then made available to the public, through individual mailings and on the Maine DMR website.

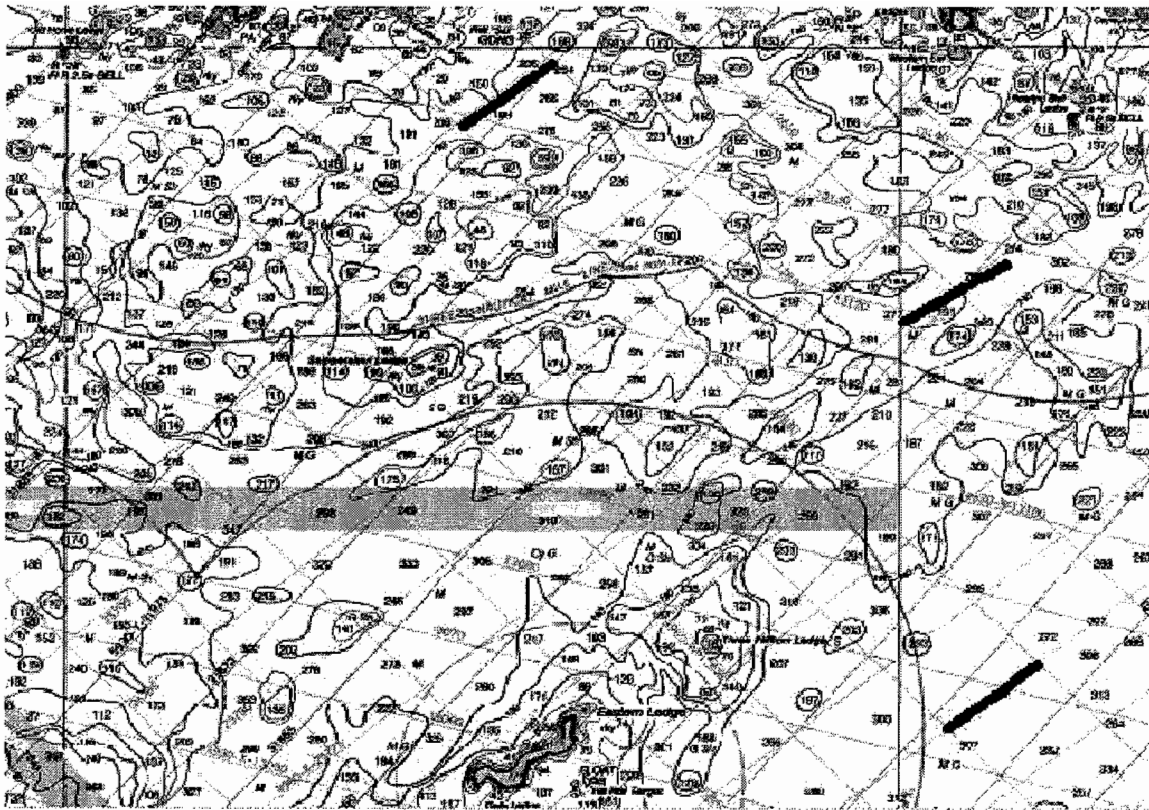


Figure 4. Example of potential tows identified from charts and local knowledge.

Vessels

Two, virtually identical commercial fishing vessels, the F/V Tara Lynn and F/V Robert Michael, were used for the survey. While only one vessel at a time was planned for each survey, in the event of an equipment breakdown, the other could be made immediately available so that the survey could be completed on schedule. Both vessels are Down East 54's constructed of solid fiberglass with full displacement hulls taken from the same mould. They are powered by 8-cylinder GMC diesel engines producing 325 H.P. The reverse gear is a twin disk and a 3-in. stainless steel shaft turns a 4-bladed power propeller housed in a nozzle. The vessel's hull displacement is 73-gross tons allowing it to perform well in sea states up to eight feet.

Net

Trawl design considerations for the survey included effectiveness of the gear for sampling the complex bottom in the Gulf of Maine and approximate comparability with previous and ongoing surveys. The net is a modified version of the shrimp net design used in Maine waters (Figure 5).

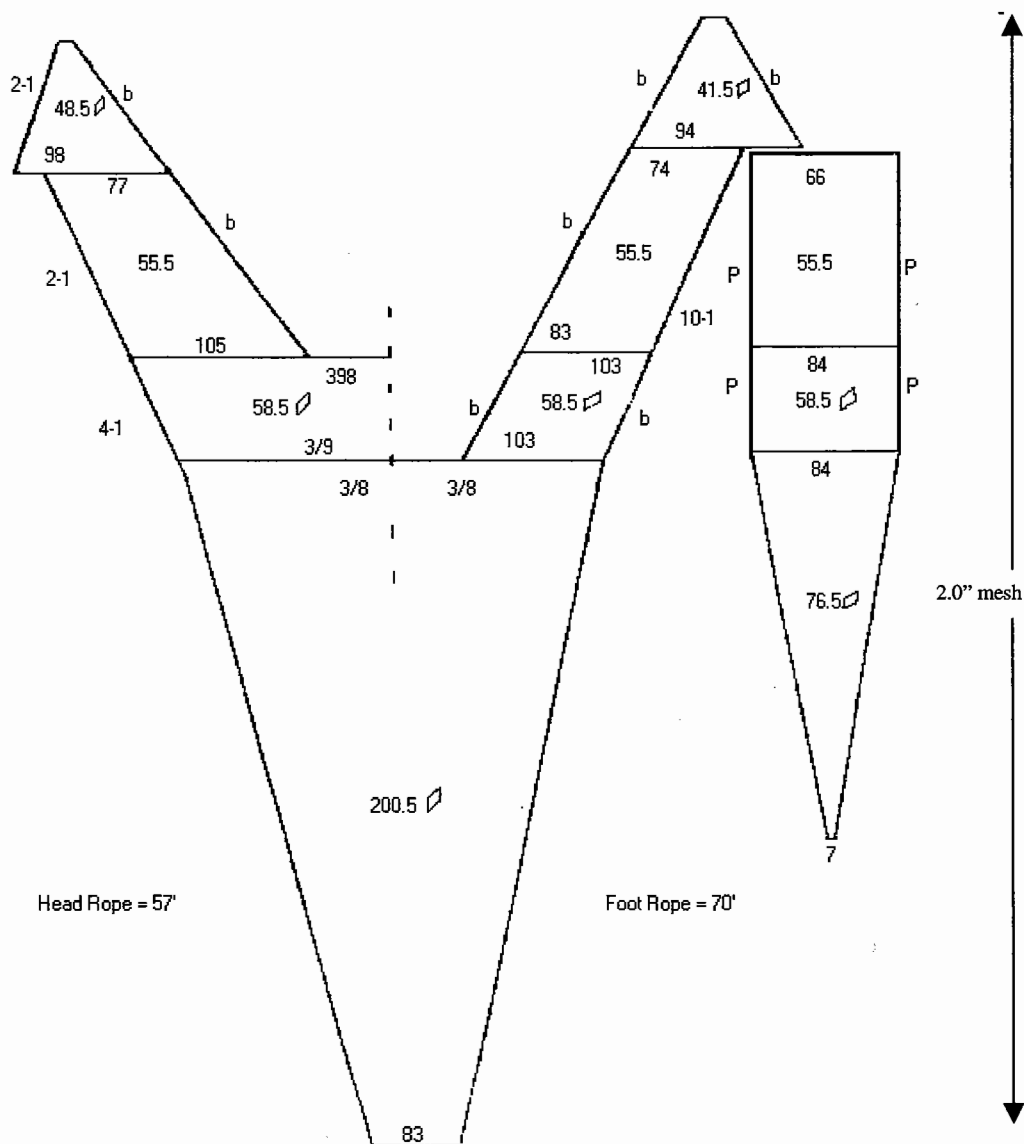


Figure 5. Net Design for the Maine – New Hampshire Inshore Trawl

The net was designed by Bob Tetrault and his net designer, Jeff Flagg, to fish effectively, be easily maintained, and be towed by vessels ranging from 45 – 70 ft. with nominal horsepower. Net tapers were cut to permit the shape of the net to get maximum height, while allowing the net to remain tight on the bottom. The net is shackled from the footrope to the frame using two 3/8-inch shackles to a banded wire that runs parallel with the footrope. Heavy rubber wing bobbins retard bottom wing lift. The top leg is 3/8th inch wire, 10 fathoms long, and the bottom leg is 10 fathoms of 2 3/8th -inch cookie covered wire. The net is constructed of 2-inch mesh overall with a 1/2 inch mesh liner in the cod end. Doors are #7.5 Bisons. The 70 ft. footrope includes 70' of 4-inch cookies tapered with 6-inch cookies to several 8-inch cookies in the bosom. Chain sweeps were not used. Before each survey, the vessel's crew measured all nets for consistency and

adjusted/repaired as needed. Trawl wires on the vessel were also measured prior to each survey. When necessary, the net is sent back to the manufacturer where it is returned to specification.

Before the fall 2000 survey the net was tested, adjusted and our survey net towed side-by-side with a commercial net. Catches between the nets were compared for relative proportions and species caught. The catches were comparable. Further assurances of proper and consistent net performance were made utilizing net mensuration sonar and cameras in 2002.

Public Notification

Due to the extensive fixed gear fisheries in the coastal waters of Maine and New Hampshire, an inshore trawl survey must coordinate with these fishermen. We requested that fishermen clear gear from the tows to accomplish the sampling schedule. Staff attended Lobster Zone Council and other meetings to notify the public of the timing and location of the survey tows. Results of previous surveys were disseminated here as well as at the Maine Fishermen's Forum. Prior to each survey, mailings concerning the schedule were sent to all Class I, II and III lobster license holders.

To stay on a predictable schedule around which fishermen could conveniently plan, a conservative number of tows, usually four or five, were scheduled on any given day. In addition, we chose to work the first five good days of the week leaving two as make up days when weather or equipment problems prevented us from working. To aid predictability, several other means of communication were established. A web site was dedicated to providing full details of the daily schedule, similar to that sent in the mailings. Pre-recorded announcements were broadcast over the NOAA weather radio. For accurate daily information, a 24-hour toll-free telephone line was made available. For "real time" information, we encouraged fishermen to contact the trawl survey vessel on Channel 16 or 13. Finally, office, home and cell phone numbers of key survey staff were provided to fishermen in the mailings.

Sample Collection (Towing)

Before each tow, at least one pass, and often two passes, was made along each planned tow line. On each pass, the area was surveyed for fixed gear and the bottom sounded, horizontally and vertically, to identify bottom obstructions. Where bottom was deemed towable and a route through gear identified, the net was dropped to the bottom. A target time of 20 minutes was sought, but shorter tow times were accepted under certain circumstances. Location (Loran C coordinates, GPS latitude, and longitude), time, depth, direction, and duration were recorded for each tow. Bottom temperatures and salinities were collected at each station for using a SeaBird Model SBE 19-plus CTD. Other environmental data, wind, sea state, and weather were also recorded at each station. All tows were conducted during daylight hours.

Handling Catch

After each tow, the net was brought aboard and emptied onto a sorting table. All individuals were identified and sorted by species. All lobsters were immediately separated and processed while the rest of the catch was sorted. Total weights (by sex), carapace length (mm), shell condition, presence and stage of eggs, V-notch condition, and trawl damage were recorded. After processing, lobsters were carefully placed in baskets in order to minimize further damage. Larger more aggressive individuals were kept separate. Baskets were weighed and the lobsters were

returned alive to the sea. Similarly, care was taken to immediately separate, measure, weigh and release alive any marine specimens.

Finfish lengths were measured as total central length to the nearest centimeter. Crabs were measured using carapace length (cm). Scallops were measured using the width (cm) of the shell. Other bivalves were measured using the length (cm) of the shell. Squid were measured using mantle length (cm). All other invertebrates were enumerated. Aggregate weights were taken for all species. When catches were large (i.e. > ~200 individuals) a subsample of at least 100 representative individuals was taken, measured and weighed. Total catch statistics were then expanded based on the total catch weight. Lobsters were not routinely subsampled but rather all individuals were measured.

In the spring 2002 survey, additional biological data were collected, including individual weights, sex, and maturity for selected groundfish species using the methods described in Burnett *et al*, 1989. Fish examined were designated as immature (I), developing (D), ripe (R), ripe/running (U), spent (S), or resting (T). When possible, all individuals selected were examined; a sub-sample was taken if the catch of a particular species was large. Otoliths were collected for winter flounder.

Ichthyoplankton Tows

A plankton survey for fish larvae and eggs was done in the fall of 2001 and spring of 2002. All samples were collected with a 1-meter plankton net of 333 μ m mesh. A General Oceanics flowmeter was attached to the mouth of the plankton net to determine the amount of water filtered by the net for each tow. The net was towed for fifteen minutes in a stepped oblique fashion at a speed of less than 2 knots for five minutes below the surface, five minutes at 10 m below the surface, and five minutes at 20 m below the surface. Upon haul back, the contents of the net were emptied into a 1l container while rinsing the end of the net. The larvae were preserved in formalin for later identification by the Atlantic Reference Centre of the Huntsman Marine Lab.

Release of Data

In direct response to concerns expressed by Maine's fishing communities, we have developed a policy on the release of raw data collected from individual tows (see Appendix D).

In summary,

- 1) provisional data will not be released to the public
- 2) tow specific lobster data will be held for one year before release
- 3) exceptions are permitted where management and regulatory decisions may benefit

Results

Two major surveys were conducted, one in the fall beginning September 23, 2001 and a second in the spring, beginning on May 4, 2002. The fall cruise ran for 22 days, being cut short in eastern Maine due to fixed gear conflicts. The full 25 days were utilized to finish the spring survey. Completed tows for each survey are shown in Figure 6. Descriptive data, including geo-references, tow duration, depth, salinity and temperature for each survey are presented in Appendix A.

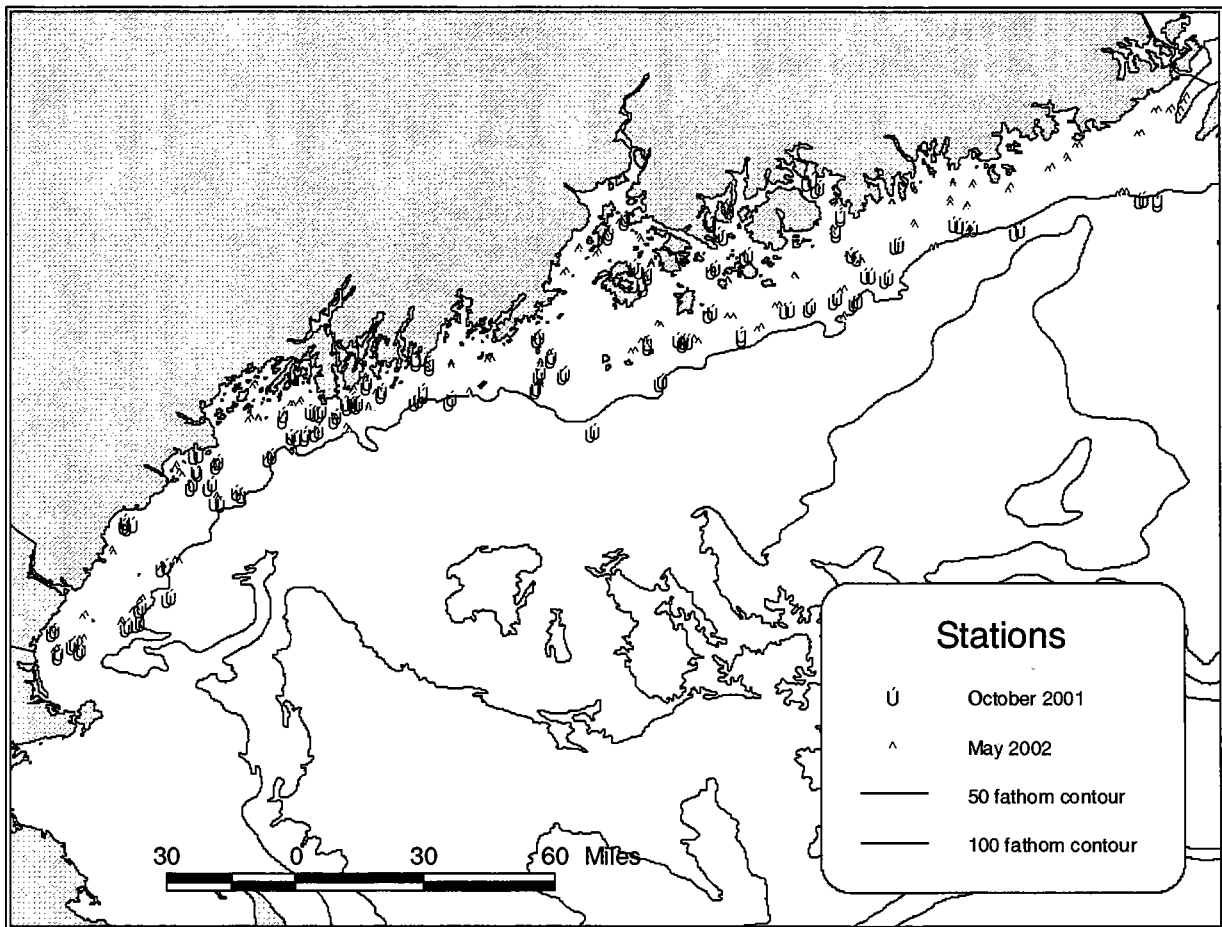


Figure 6. Locations of Fall 2001 and Spring 2002 tows. No tows were completed in the 2 inshore strata for the region beyond the Schoodic peninsula in the fall of 2001. Overlapping symbols represent start and end of each tow.

Fall 2001 Summary

Seventy-five of the 105 planned tows were made. Five extra tows were added to this survey's original target of 100 tows. Unsuitable bottom, presence of fixed gear and public protest prevented us from towing at 30 stations. All tows in strata 1 and 2 of region 5 were abandoned to appease public dissent. The volume of the total mixed catch varied from a minimum of 20 kg to a maximum of 1727 kg per tow. The average weight of catch was about 213 kg per tow. The total number of species caught in the fall was 77 with a low of 10 and high of 33 in any particular tow. Typically, the lowest diversity is seen in the shallow strata and the highest in the deeper. Relative coast wide ranking for the top 10 species is reported below in descending order.

By Number

Silver hake*
Herring*
Mixed Pandalid shrimp
Alewife
Lobster
Rainbow smelt
Red hake
Witch flounder*
Sea scallop
American plaice*

By Weight

Silver hake*
Lobster
Herring*
Dogfish*
Monkfish*
Alewife
Red hake
White hake*
Jonah crab
American plaice*

* Species managed by the New England Fisheries Management Council

Spring 2002 Summary

Ninety-four out of a proposed 105 tows were made in the spring. Unacceptable bottom and presence of fixed gear accounted for the missing 11 tows. Weight of total mixed catch varied from a minimum of 4.5 kg to a maximum of 410 kg per tow, with an average of 95 kg per tow. Diversity per tow ranged from 8 to 29 species. Total number of species caught during the Spring 2002 survey was 80. Relative coast wide ranking for the top 10 species is reported below in descending order.

By Number

Euphausid shrimp
Herring*
Mixed Pandalid shrimp
Silver Hake*
Alewife
Lobster
Longhorn sculpin
American plaice*
Winter flounder*
Sea scallop*

By Weight

Herring*
Lobster
Silver hake*
Longhorn sculpin
American plaice*
Alewife
Atlantic cod*
Winter flounder*
Mixed Pandalid shrimp*
Sea cucumber

* Species managed by the New England Fisheries Management Council

In addition to the two major surveys, three shorter surveys were conducted for various reasons. In July 2001, a 7-day cruise was conducted along both coasts to look at species distribution and abundance in the summer. Figure 7 shows the tows completed in July, and Appendix A contains

the descriptive data for July. In August of 2001, a 5-day survey was conducted to investigate the effect on trawl catch volume as a result of tow orientation to the tidal current. And in February of 2002, four days were dedicated to investigating the effects of trawling with our research net on the benthos. A supplemental video provides these results.

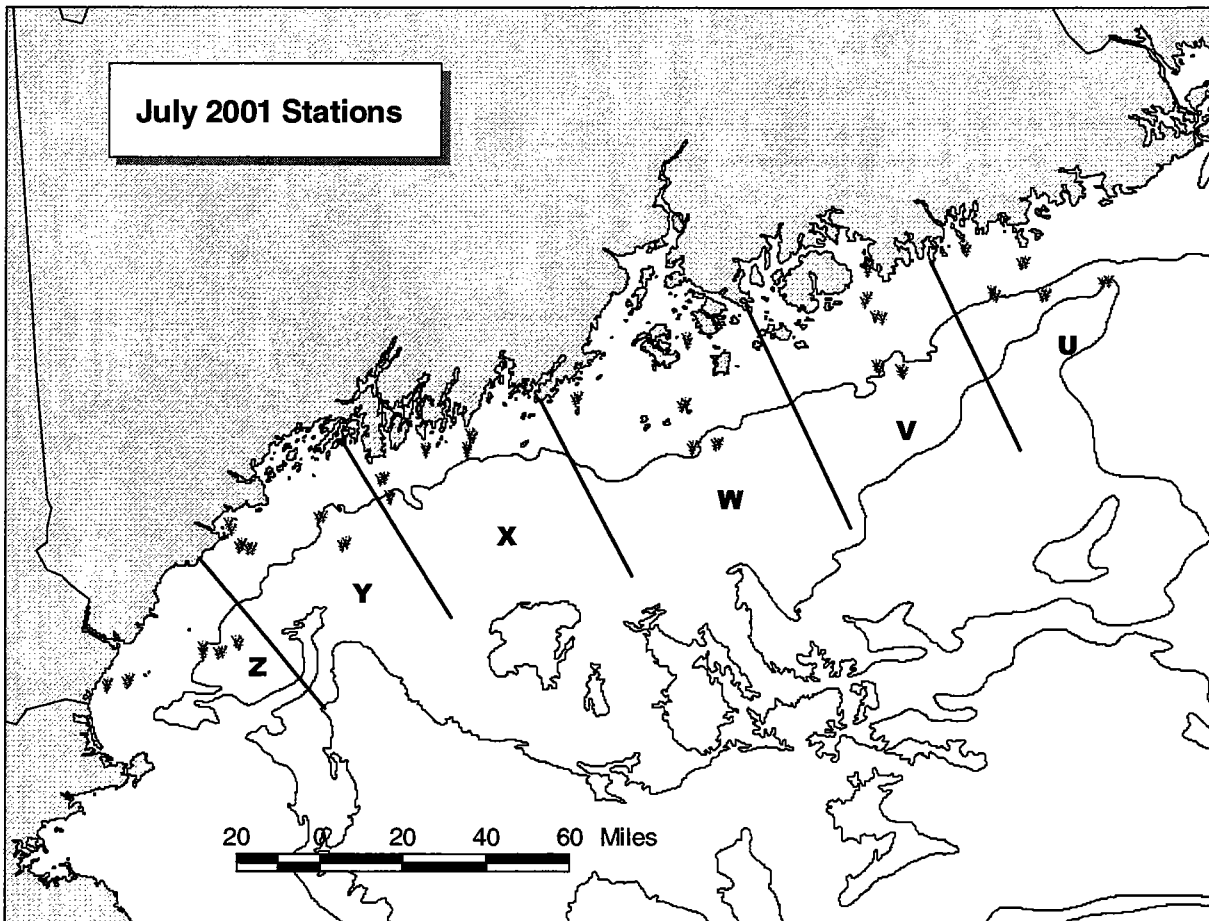


Figure 7. Tow locations and transect designations for the July 2001 survey. Six transects and 5 stations per transect were completed.

July 2001 Special Survey Summary

Each transect covered five strata from 5 to 80⁺ fathoms. The summer species assemblage, year class distribution, and species diversity was compared to fall survey results. This comparison was done to help answer whether or not fall surveys occurs when the sample size and diversity of species are at a seasonal maximum. Dogfish pups (Figure 8) are absent in fall 2000 and reappear in abundance the next fall and to a lesser extent just prior to that survey in July. Redfish were much more abundant in the fall 2001 survey (Figure 9). The reason for this is not clear, due to the short time series. In comparison with summer results, there seem to be more fish later in the year and a juvenile size class represented in the fall that was absent from the July survey. The number of silver hake caught per tow in July was much smaller compared to the number caught in the fall (Figure 10). However, more fish >43 cm were present in July. There was no major difference in the size frequencies of white hake sampled in the fall versus July, although fewer

white hake <21 cm were caught in the summer (Figure 11). Species diversity was lower in July with 68 species encountered as compared to 76 species in each of the fall surveys.

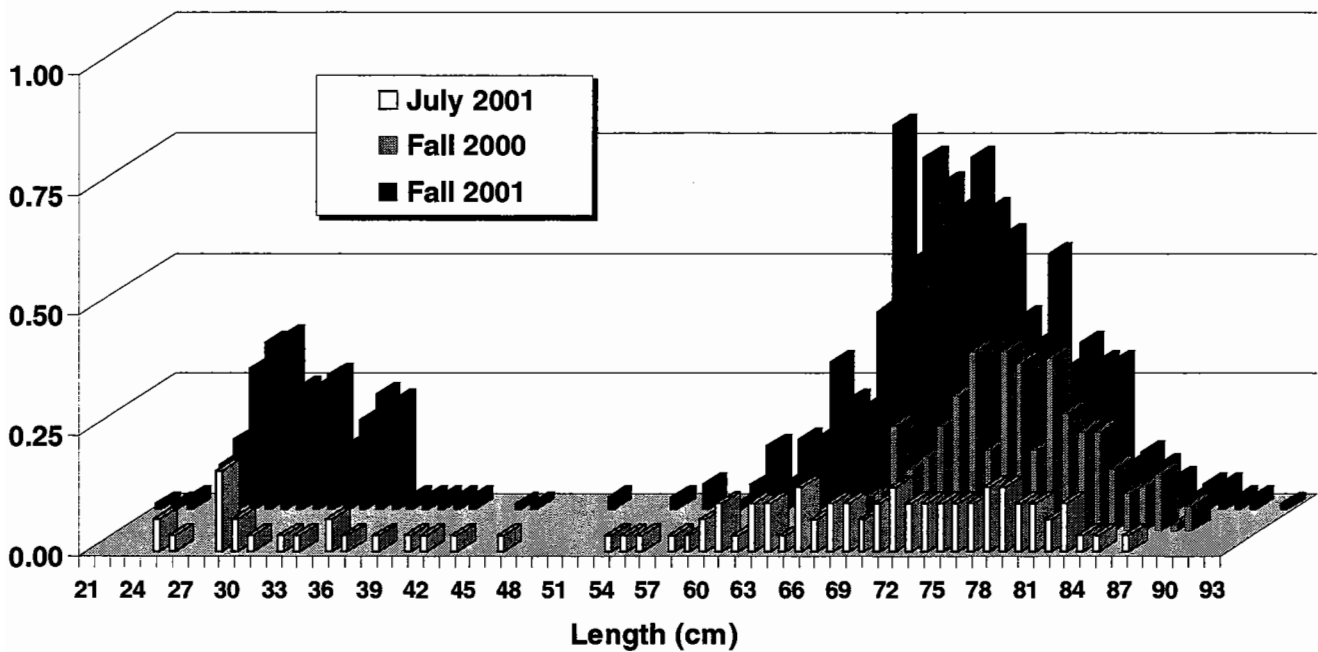


Figure 8. Mean number at length for spiny dogfish (*Squalus acanthias*) in the summer and fall, all strata combined.

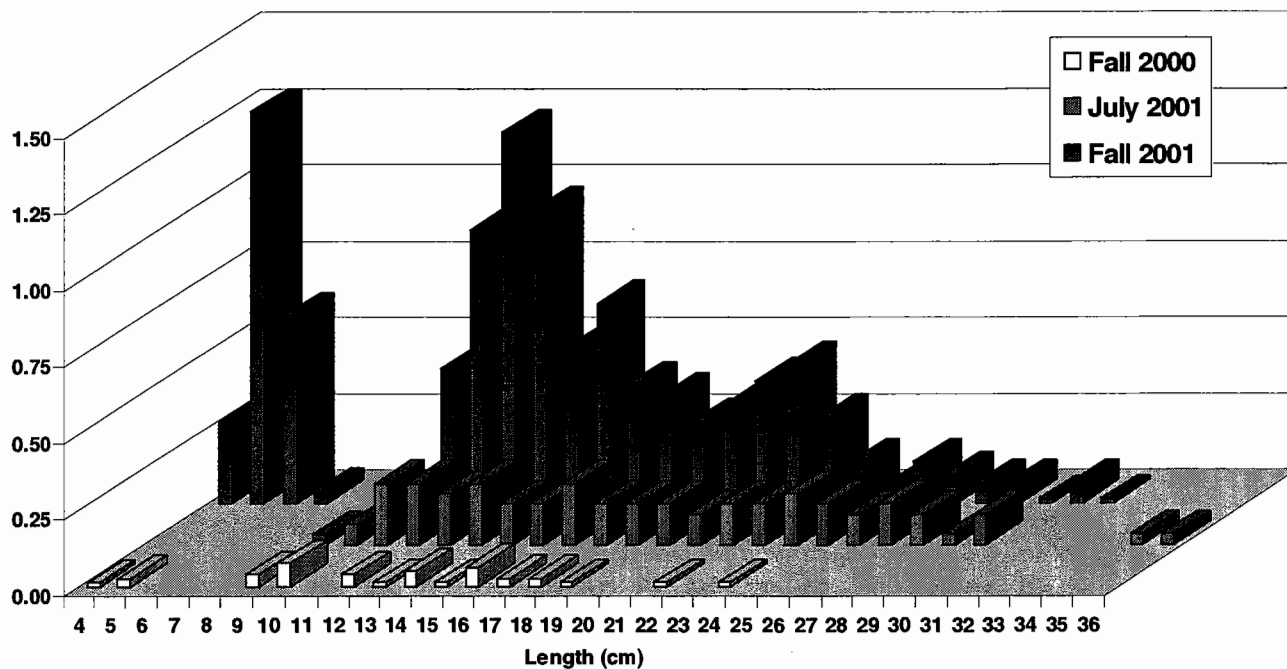


Figure 9. Mean numbers at length for Acadian redfish (*Sebastes fasciatus*). Note the change in the order of the data series for an unobstructed view of each.

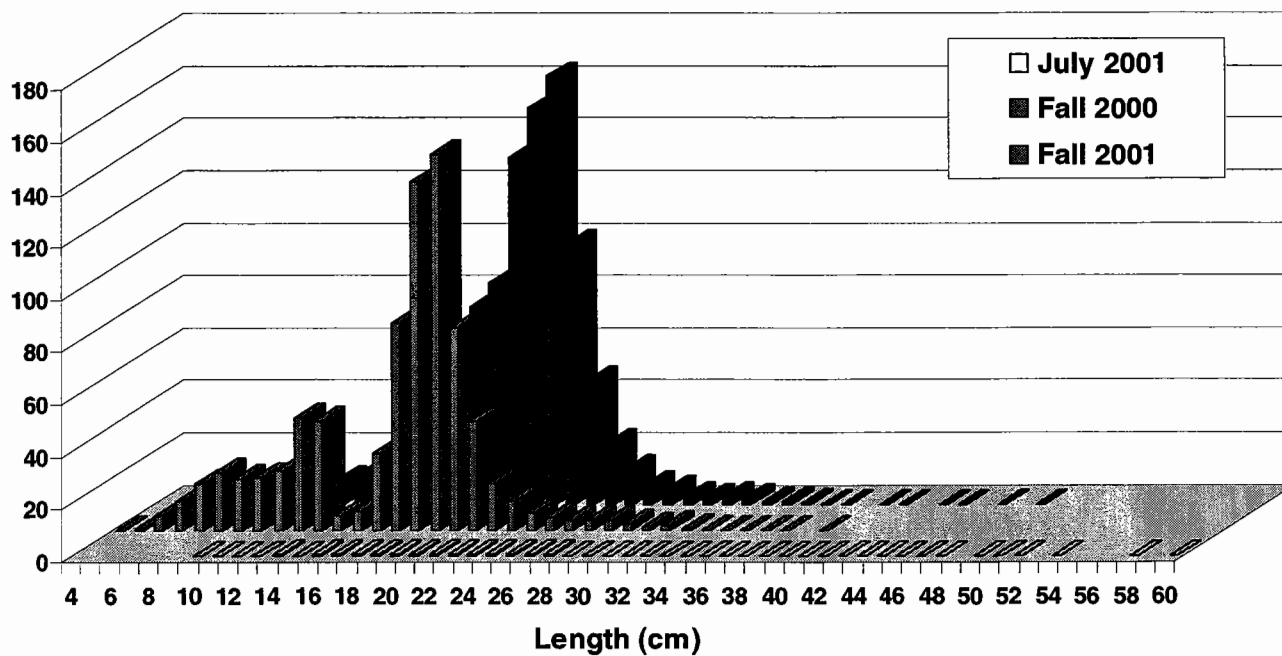


Figure 10. Mean number at length for silver hake (*Merluccius bilinearis*).

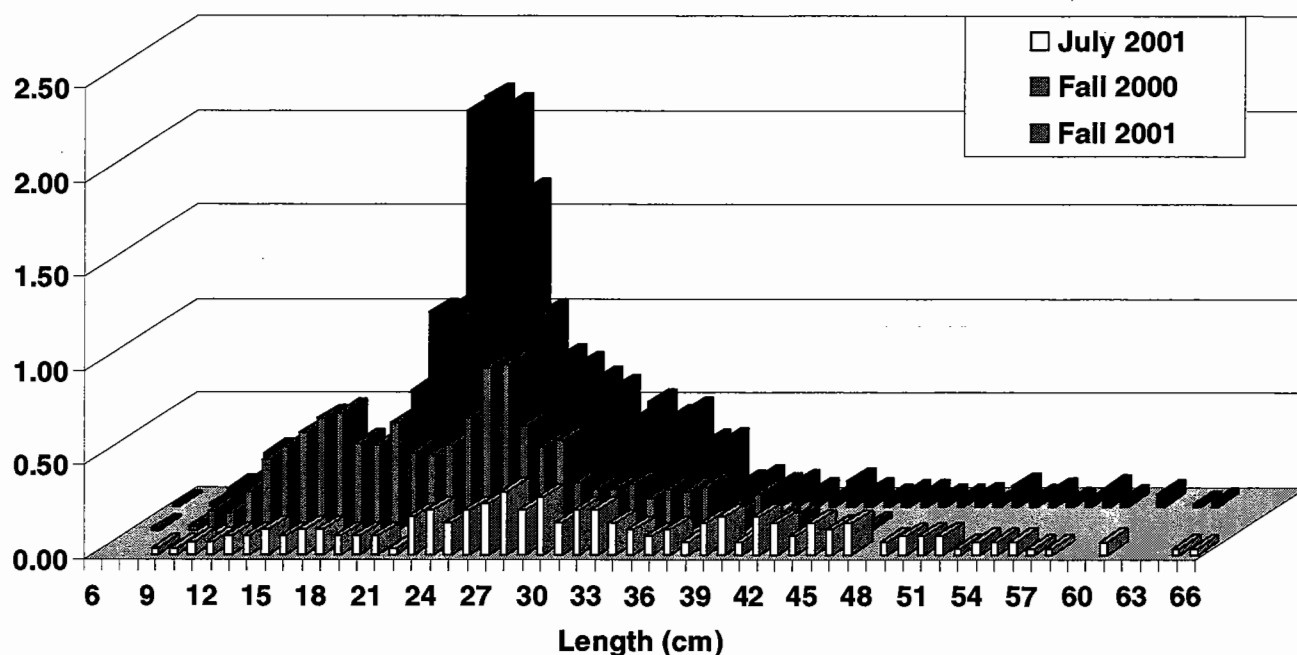


Figure 11. Mean number at length for white hake (*Urophycis tenuis*).

August 2001 Special Survey Summary

The objective of the cruise in August of 2001 was to determine the effect of tow heading in currents on catch size (weight) and consistency. Four tow treatments were selected; against-tide, with-tide, slack-tide, and cross-tide. A week charter on the F/V Tara Lynn was arranged and stations were selected between region 1 and region 2. It should be noted that the tides during the study were neap tides. No significant difference in catch was observed for any species between treatments. Fishing gear efficiency studies require a very high number of replicate tows to yield significant effects between treatments using even the most robust statistical analyses. Therefore, whole catch weight per treatment in Table 2 below served as the basis for comparison between treatments since the sample size was small (N=30 tows). In most areas, except Small Point, towing with the tide yielded larger catches than towing against the tide or across the tide.

Table 2. Total biomass caught in each treatment by area.

TOW ORIENTATION IN CURRENT				
	Against	Cross	Slack	With
LOCATION W-E				
Southern Maine	645.4	307.87	775.7	839.83
Off Saco Bay	379.17	288.94	1620.06	405.53
Off Cape Elizabeth	288.05	293.62	473.05	339.16
Off Small Pt.	774.08	804.31	958.85	703.4
Grand Total	2086.7	1694.74	3827.66	2287.92

Ichthyoplankton

In the fall of 2001, 29 ichthyoplankton tows were made from regions 1 through 5. A total of fourteen different taxa of larvae were collected, identified, and measured (Table 3). Eleven kinds of eggs were identified. Some of the more common larvae in terms of density were the hakes (*Urophycis* spp.), fourbeard rockling and silver hake. A large number of Atlantic herring larvae were found in region 5, perhaps a product of late summer spawning in Canadian waters. Many others found primarily in region 1 were fish that are more common in the southwestern region than in the east. Fourbeard rockling, silver hake, and red or white hake were also well represented in the eggs identified. Spring 2002 samples have not yet been examined.

Table 3. Mean catch (100 m⁻³) of larvae (<28 mm SL) and eggs for each region in which ichthyoplankton tows were done during the Fall 2001 survey. Maximum values are shown in parenthesis. Classification of eggs was lumped if undistinguishable by species into the categories H4B (*Urophycis* sp., fourbeard rockling, windowpane, and butterfish) and CHW (cod, haddock, witch flounder).

Larvae	Region 1	Region 2	Region 3	Region 4	Region 5
Atlantic Herring			0.11 (0.51)	1.13 (4.46)	12.35 (20.83)
Lumpfish		0.01 (0.11)			
Fourbeard Rockling	3.05 (8.73)	3.19 (10.60)	1.04 (1.75)	1.79 (5.42)	0.75 (1.50)
<i>Gadidae</i>		0.06 (0.46)			
Witch Flounder	0.06 (0.39)				
American Plaice	0.04 (0.24)				
Silver Hake	3.83 (7.26)	0.30 (0.65)	0.11 (0.52)	0.57 (2.87)	0.21 (0.43)
Butterfish	0.46 (1.55)				
<i>Pleuronectidae</i>	0.06 (0.39)				
Atlantic Mackerel	0.05 (0.30)				
Cunner				0.06 (0.32)	
<i>Urophycis</i> sp.	25.07 (59.87)	0.96 (2.79)	0.16 (0.48)	0.14 (0.32)	0.43 (0.86)
Unidentified	0.46 (1.28)	0.04 (0.24)			
Red Hake	0.13 (0.39)				
Eggs					
Atlantic Herring?	0.13 (0.78)	0.31 (1.28)	0.17 (1.16)	0.04 (0.20)	
CHW	1.82 (9.68)		0.02 (0.12)	0.06 (0.32)	
Fourbeard Rockling	18.33 (58.06)	1.56 (7.20)	0.98 (2.14)	0.54 (1.91)	0.27 (0.54)
Atlantic Cod					0.11 (0.21)
H4B	145.29 (628.95)	5.50 (19.51)	1.93 (2.76)	1.08 (4.78)	1.02 (1.50)
American Plaice	1.72 (9.68)	0.08 (0.23)		0.13 (0.64)	0.11 (0.21)
Silver Hake	23.43 (77.41)	0.40 (1.92)		1.21 (6.05)	0.32 (0.64)
Butterfish	0.08 (0.39)	0.17 (0.84)			
Windowpane	0.08 (0.39)		0.01 (0.07)		
<i>Urophycis</i> sp.	134.79 (638.62)	4.27 (21.37)	0.29 (1.21)	0.76 (3.82)	0.11 (0.21)
Unidentified	0.71 (3.88)	0.15 (0.64)	0.02 (0.12)	0.11 (0.32)	

Selected Species

One hundred and ten taxonomic groups of fish and invertebrates were caught in the two years of the survey (see Taxa List - Appendix B). A species by species presentation is not practical. For this report, we have selected examples for which we can report results. The complete catch result summaries are presented by species in each stratum for spring and fall and solely by depth stratum for July in Appendix C. Note that we include some examples of non-groundfish species to demonstrate another attribute of fishery independent surveys.

Atlantic cod (*Gadus morhua*)

By looking at population structure as well as distribution, the importance of shallow inshore habitat for juvenile cod remains clear. In extreme eastern Maine, there appears to be a significant difference in abundance between fall 2000 and 2001, but this is probably an artifact of the absence of shallow strata sampling coverage in fall 2001 (Figure 12).

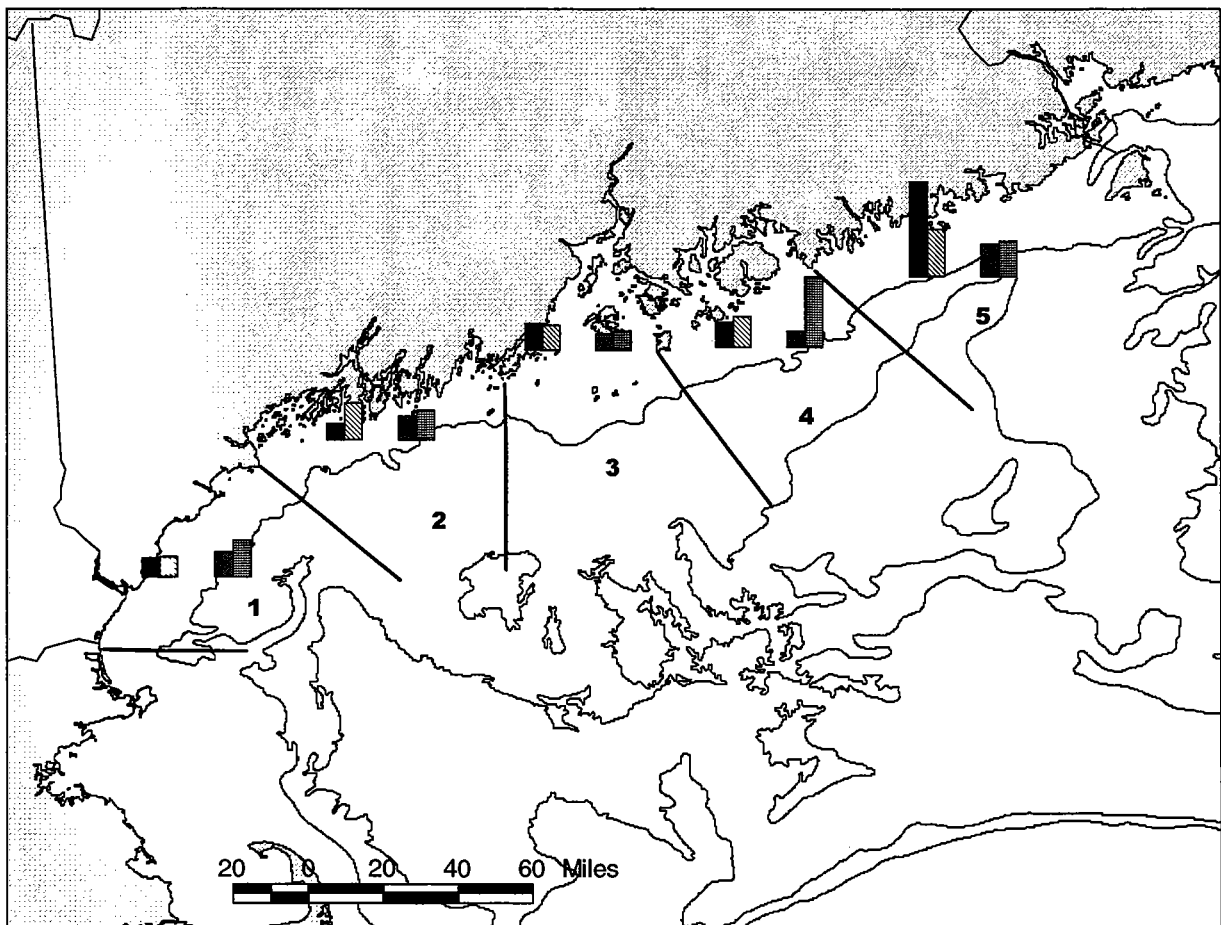


Figure 12. Distribution of cod along the Maine/New Hampshire inshore waters for each survey. Bars demonstrate mean number per tow with a minimum of less than 1 (region 4 – spring 2001) to a maximum of 20 (region 5-fall 2000).

In each fall, (Figure 13) a year class of cod that presumably hatched in winter/spring of the previous year was represented. Young of the year were observed for spring of 2001 and a small cohort appears in the fall of 2001. Few were observed for spring 2002. When compared to 2002, the total spring 2001 catch was considerably less, whereas the fall catches are similar. Bottom water temperatures were low at the beginning of the spring cruise, approximately 2° Celsius, which may account for the lack of juveniles inshore (App. A, Sowles *et al*, 2002).

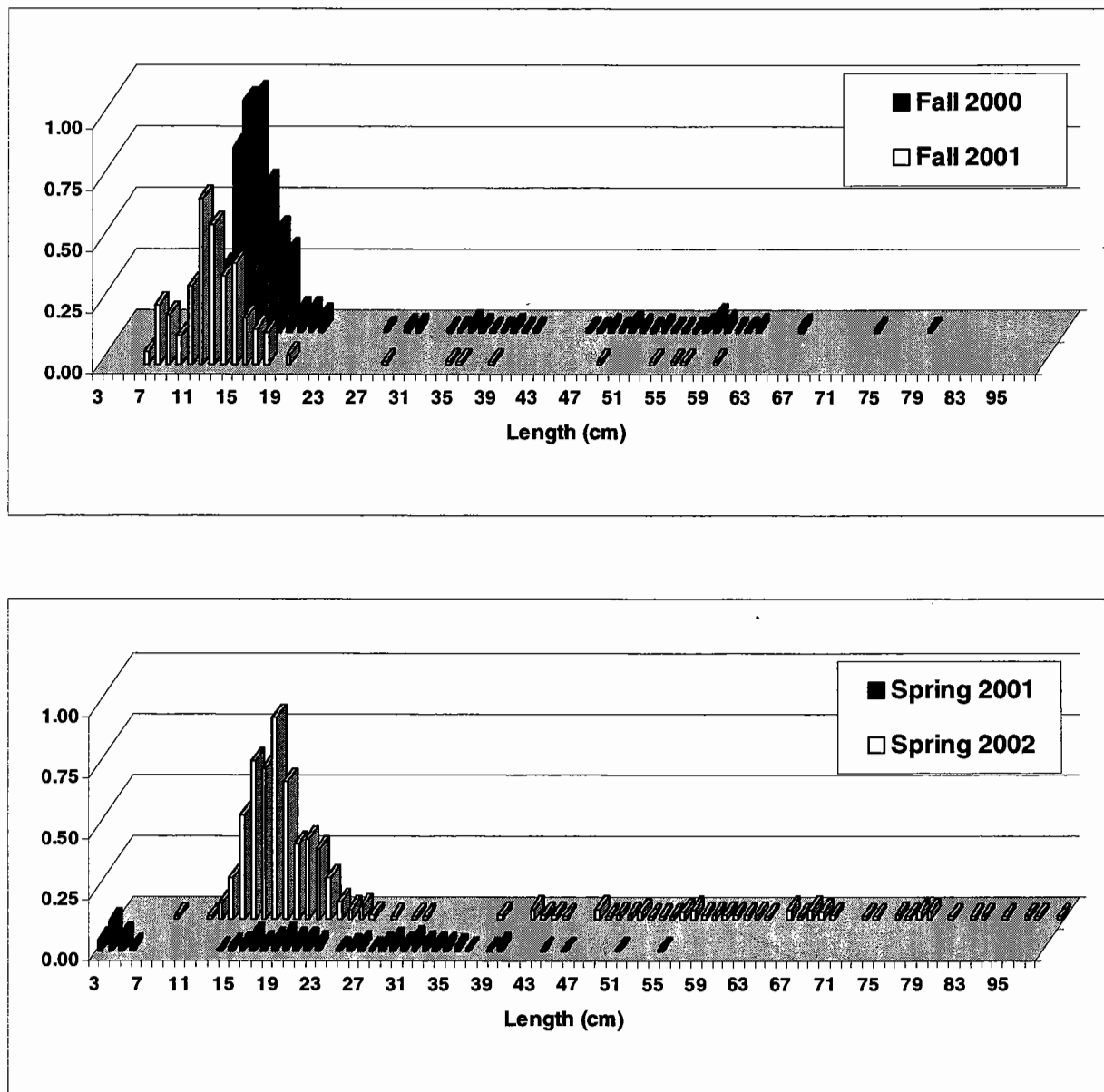


Figure 13. Length frequencies as mean number per 20-minute tow for each season's survey, all strata combined.

The state of Maine currently enacts a spawning closure for regulated groundfish inside the 3-mile jurisdiction. In the spring surveys, selected groundfish species were examined for maturity stage using the guidelines published in Burnett *et al*, 1989. Ripe and running adult cod were found sporadically along the coast (Figure 14). As the Maine spring spawning closure for groundfish “sunsets” at the end of 2002, trawl survey data will be used to evaluate the need to extend the closure during the next Maine legislative session.

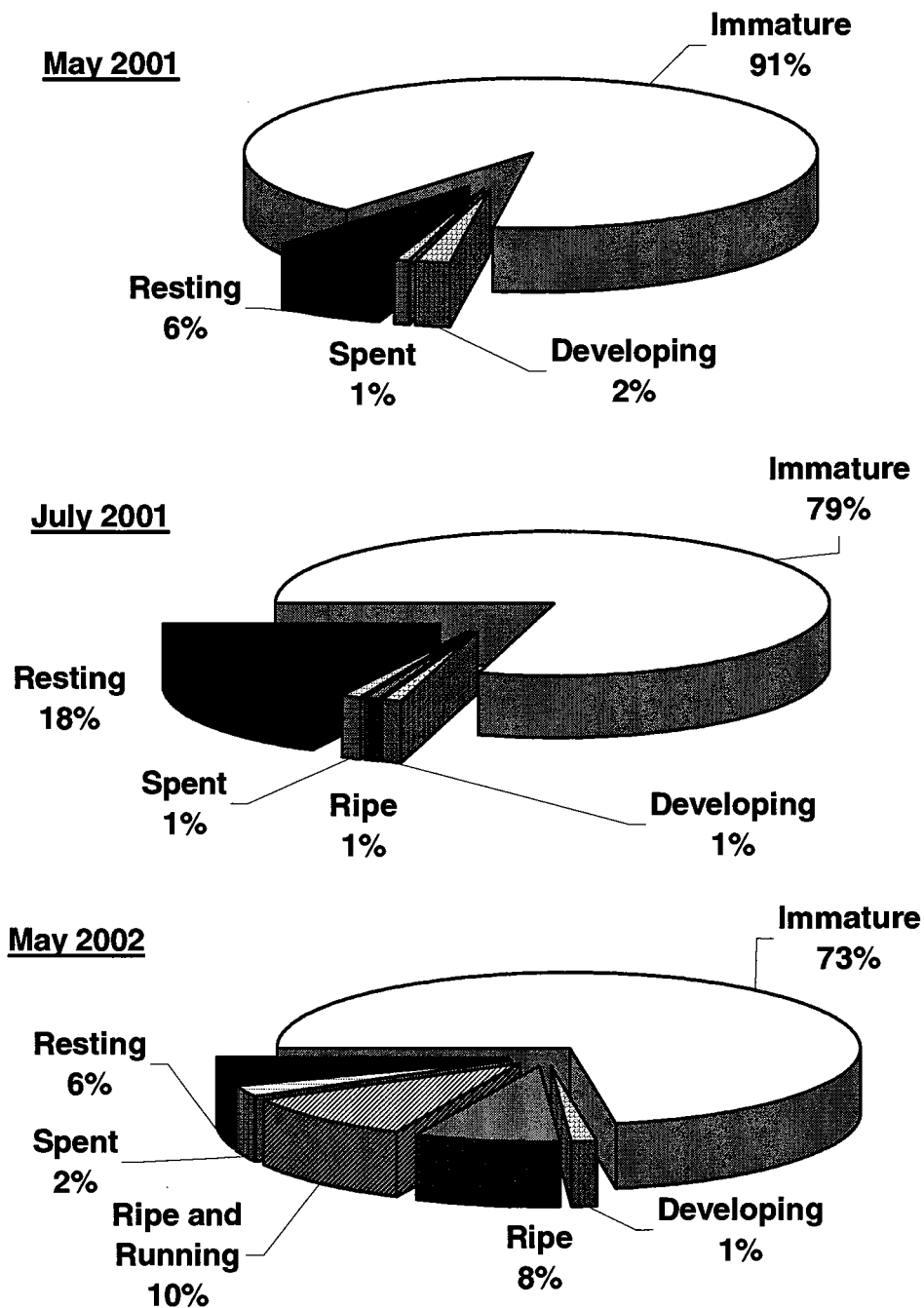


Figure 14. Maturity stages for Atlantic cod shown as percent of total caught for May 2001, July 2001, and May 2002.

Haddock (*Melanogrammus aeglefinus*)

Abundance of haddock was fairly low all along the two coasts with no distinct trend for either season (Figure 15). A slightly greater occurrence of individuals was seen in the Mt. Desert area. Juvenile haddock were more abundant in eastern Maine

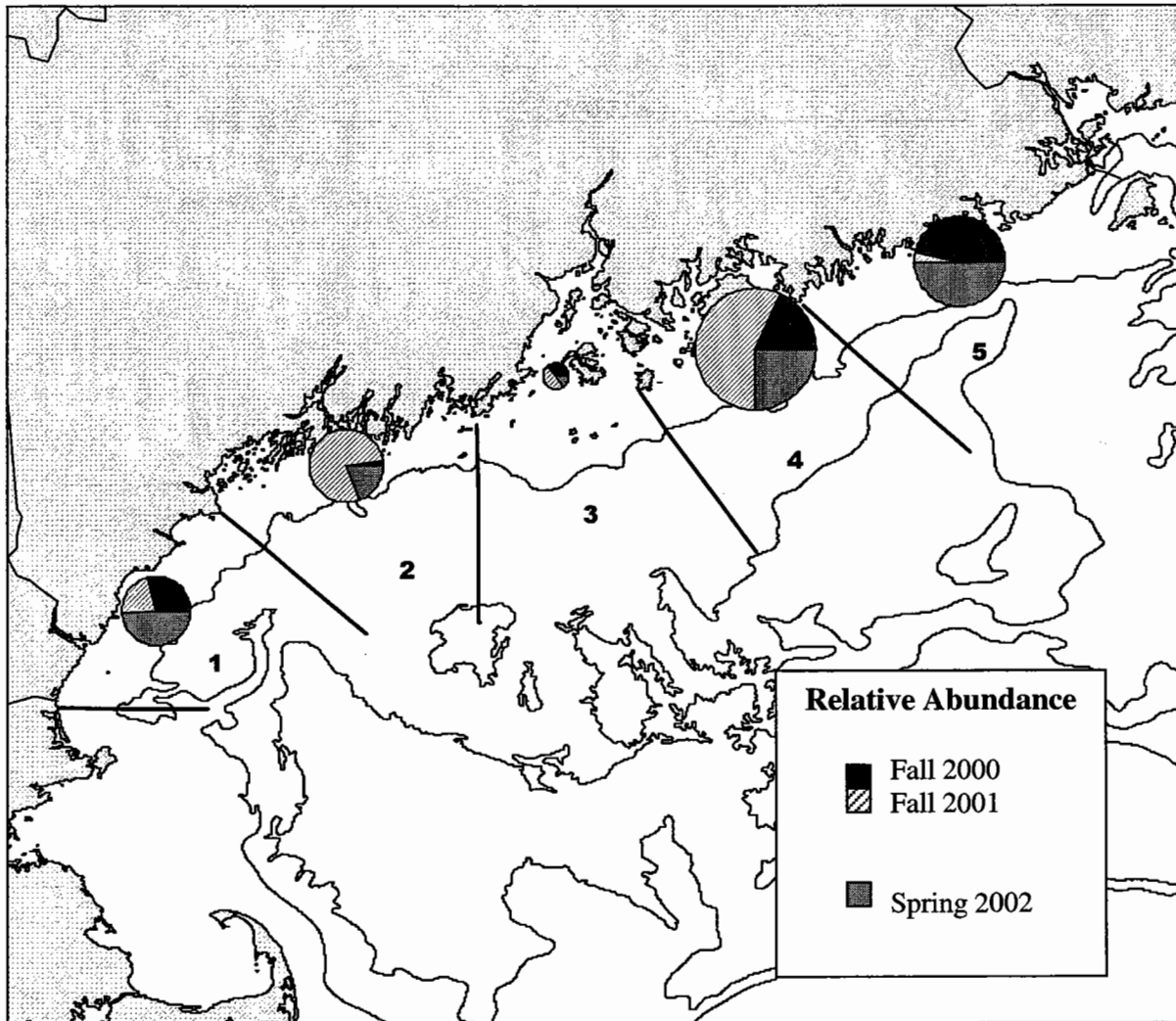


Figure 15. Distribution of haddock from the ME/NH trawl survey. The size of the pie represents the overall abundance and each piece represents the percentage per season. The largest pie represents a mean catch of 25 in region 4 and the smallest of 5 in region 3.

The majority of haddock caught were juveniles (Figure 16). A large number young of the year were caught in the shallowest strata during the fall of 2001; only one 3 cm specimen appeared in the spring of that year. Juvenile haddock feed primarily on small crustaceans (Collette and Klein-MacPhee, 2002). Regions 2 and 4, where an increase in abundance was seen, contain large areas of the sandy-gravelly substrate in which these organisms abide (Barnhardt *et al*, 1997a). Slightly larger juveniles were dominant in strata 2 in fall 2000 and spring 2002, but not in large numbers.

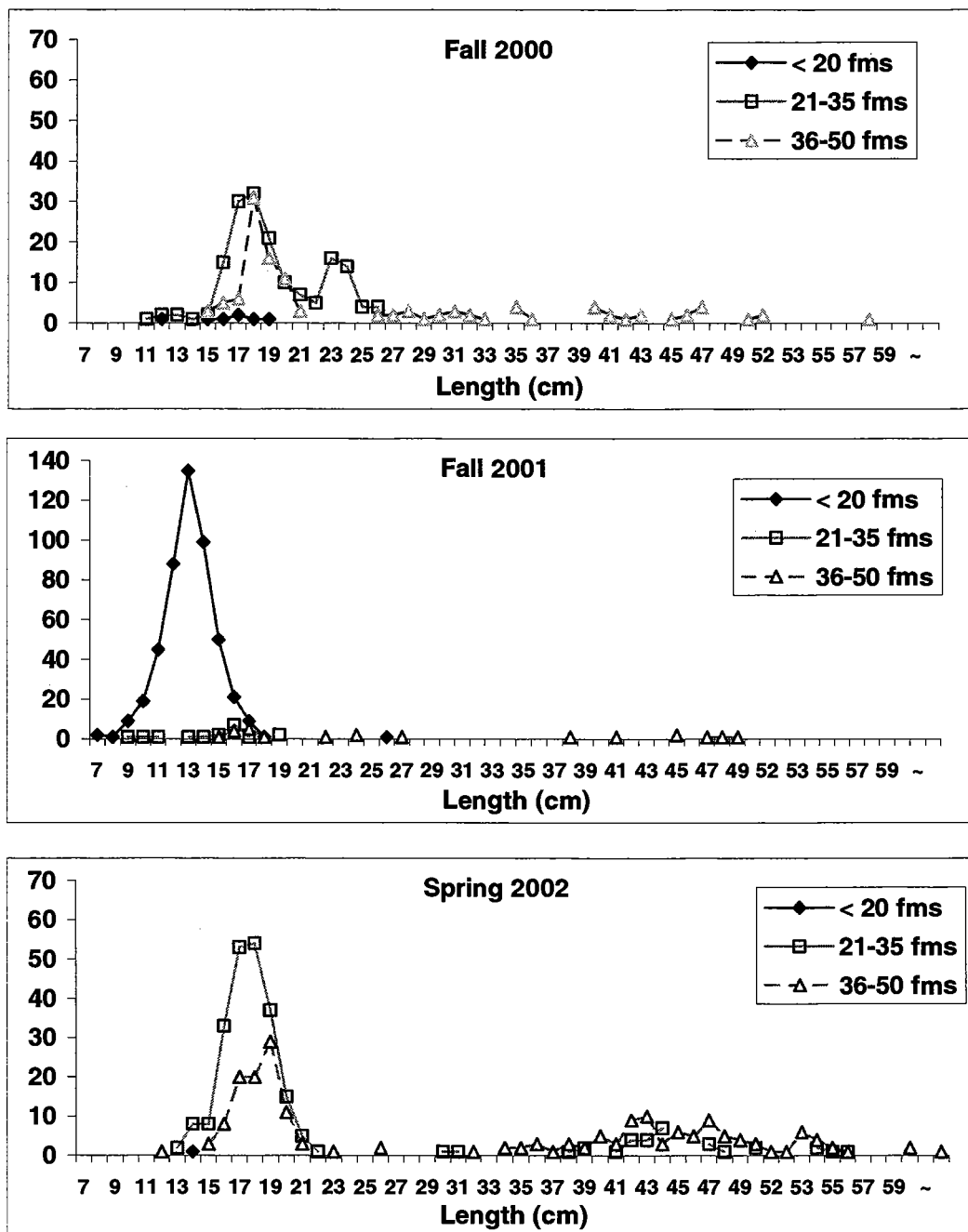


Figure 16. Total length frequencies for haddock, by season and depth strata. Take note the Y-axis scale of the fall 2001 plot is twice the spring's scale.

During the 2002 spring survey, more adult haddock were encountered and were examined for maturity stage (Figure 17). Uncharacteristically, some ripe/ripe and running haddock were found in May. Their spawning season is usually late winter (Bigelow and Schroeder, 1953). One ripe and running male at 26 cm was found in Region 2; the lower range of size at maturity is given as 32 cm in Burnett *et al*, 1989.

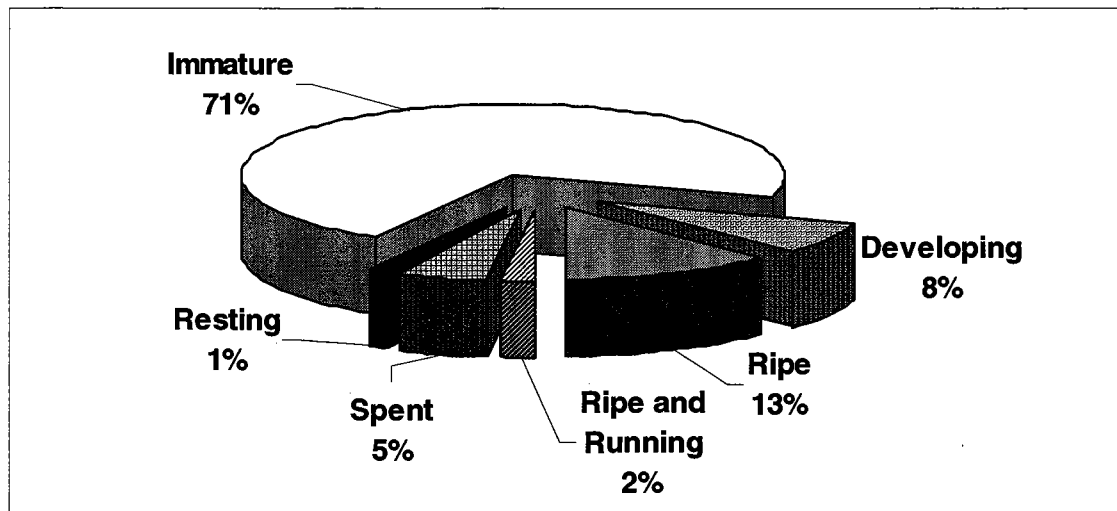


Figure 17. Maturity stages shown as percent of total caught for haddock along the extent of the survey for May 2002.

American plaice (*Hippoglossoides platessoides*)

Plaice are typically more abundant in the southwestern half of the inshore Gulf of Maine and at the greater depth as seen in Figure 18. Only spring of 2002 shows a small increase of individuals in the middle stratum of regions 1 and 2.

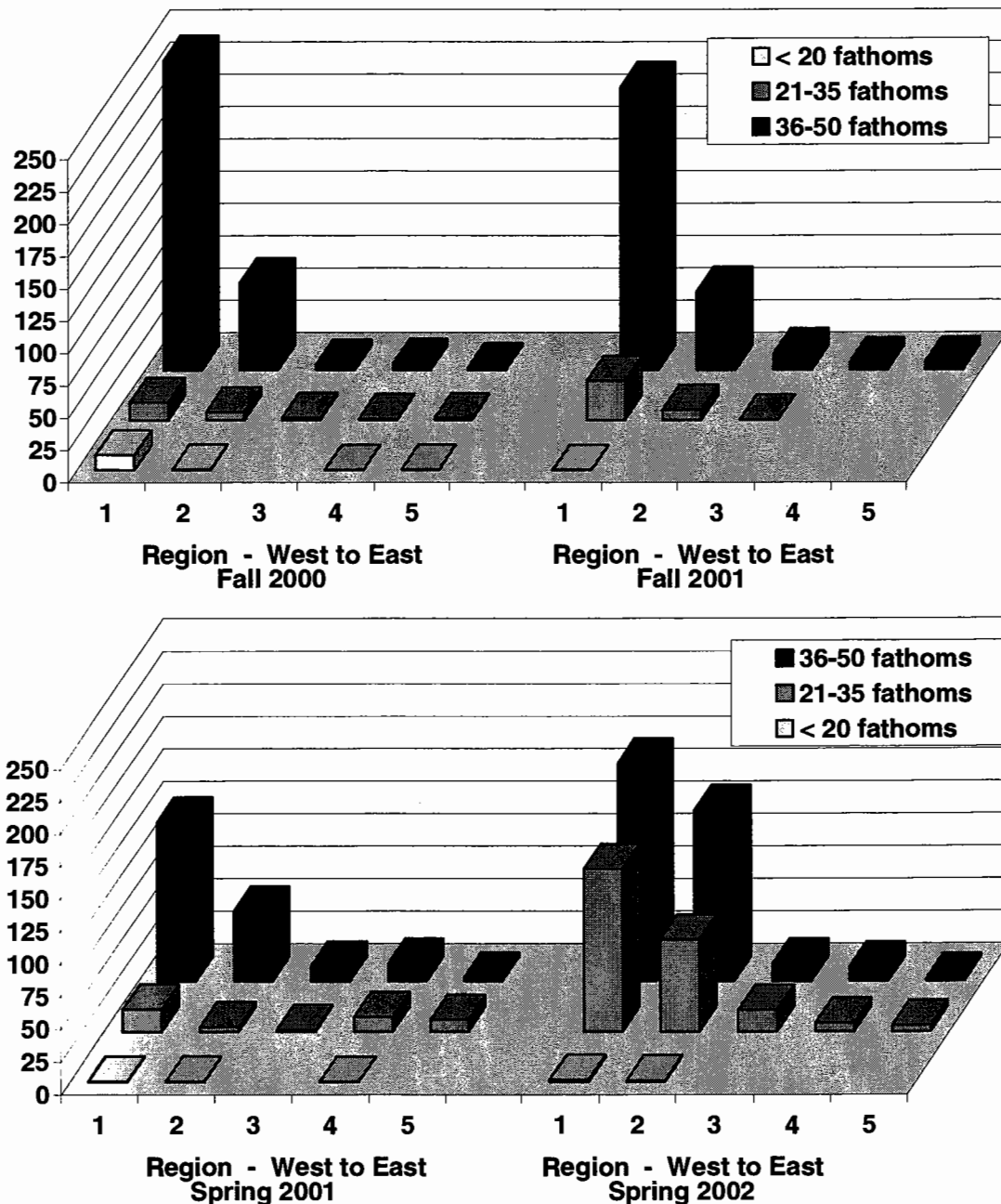


Figure 18. Distribution of American plaice for all surveys shown as mean number per 20-minute tow for each stratum

Two cohorts were observed, presumably one and two year old fish (Collette and Klein-MacPhee, 2002) in each spring's catches (Figure 19.) Again, the majority of individuals caught were juveniles.

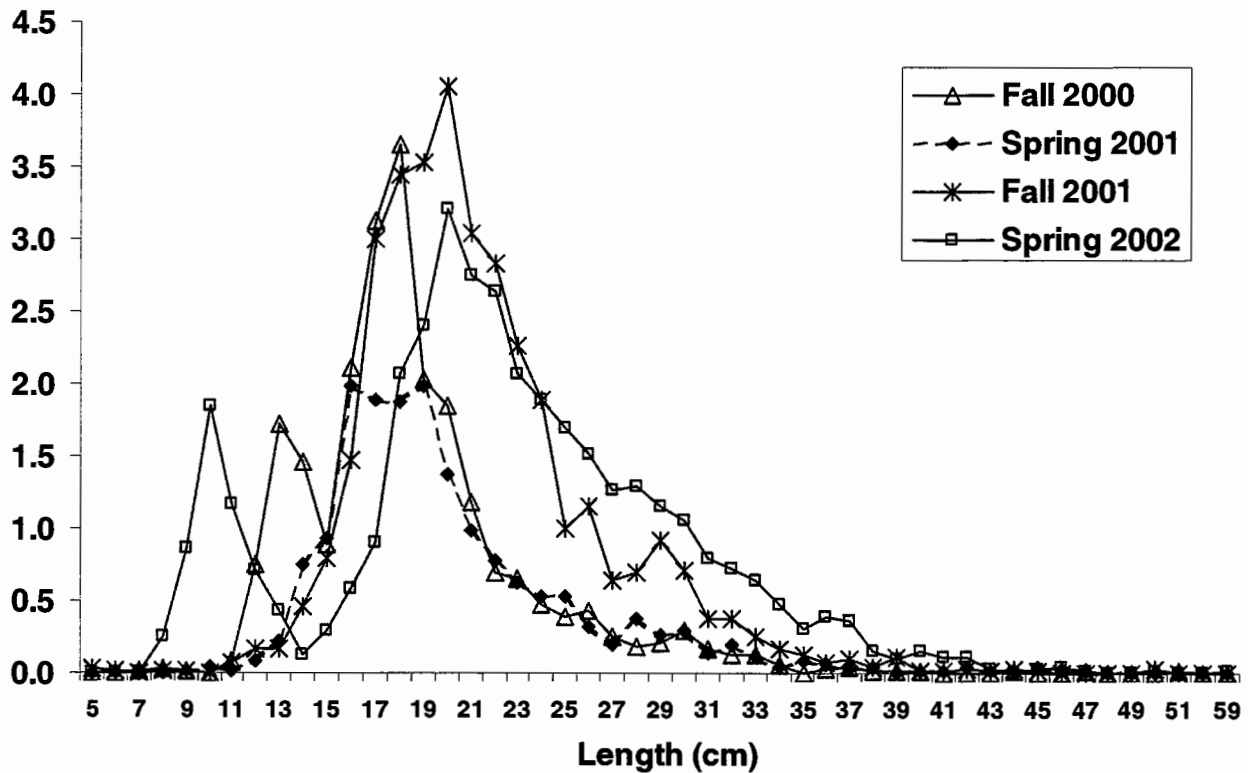


Figure 19. Mean number at length for American plaice by survey, all strata combined.

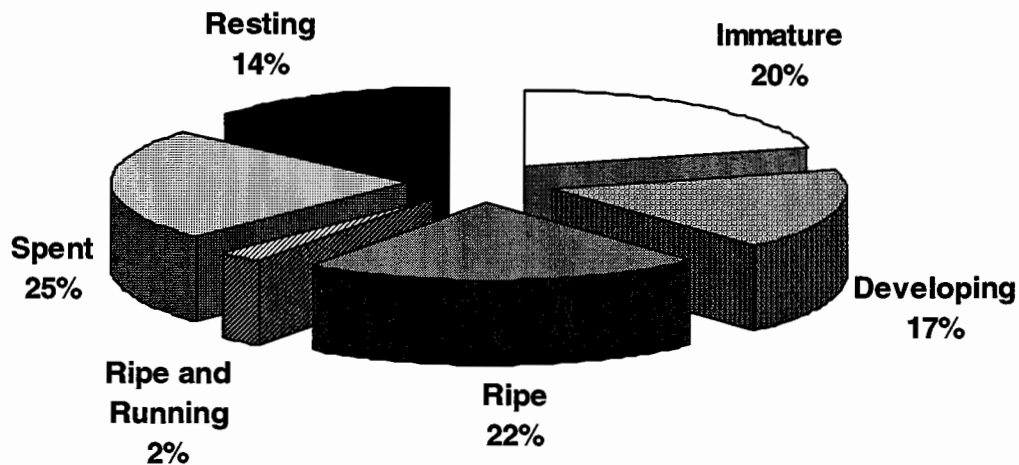


Figure 20. Maturity of American plaice for May (springs combined) shown as percent of total catch.

A relatively high proportion of adult plaice examined were in or near spawning stage in May. This is consistent with previous studies (Sherman *et al*, 1999) and lends to justification of

nearshore spawning closures. Seventy-nine percent of the concentrations of fish 17 - 30 cm in the spring were mature.

Yellowtail flounder (*Limanda ferruginea*)

Yellowtail flounder were concentrated in the southwestern range of the survey and more abundant in the deeper stratum (Figure 21). Distribution was not significantly different either by year or by season. Overall abundance was fairly low and they were not in the top ten species for quantity.

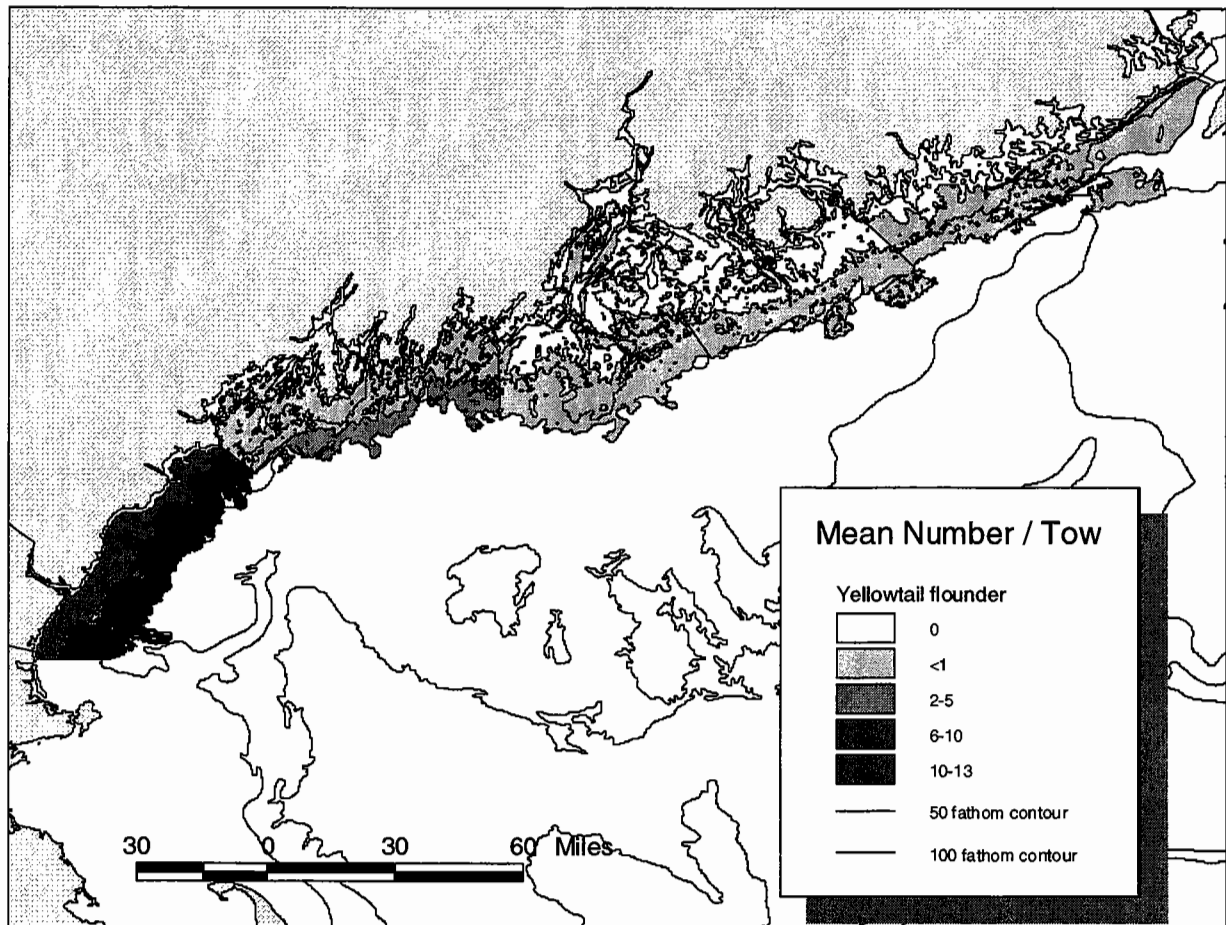


Figure 21. Distribution by stratum of Yellowtail flounder for all surveys combined.

Larger juvenile and adult yellowtail were more commonly caught which differs from most species seen in these surveys. No fish < 17 cm were seen (Figure 22). The peak occurrence of the spawning period is May-June, (Burnett *et al*, 1989). Due to the timing of the surveys and the design of the sampling gear we could be missing the young of the year.

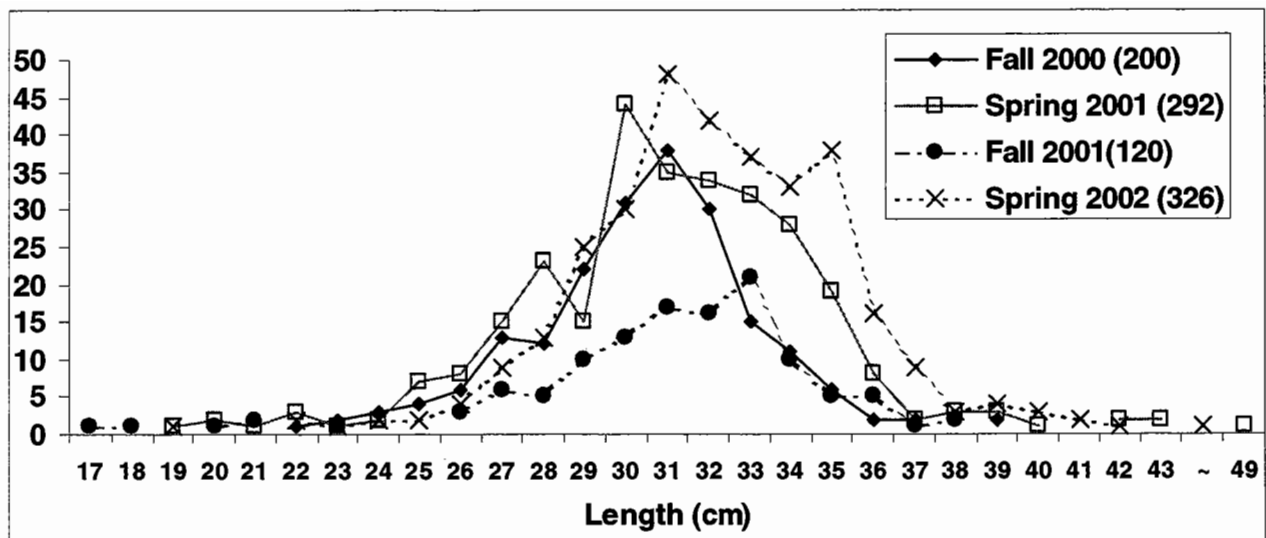


Figure 22. Total length frequencies for yellowtail by survey with all strata combined.

Only a small percent of the individuals examined were immature fish in both spring surveys and the majority were developing (Figure 23). Also a good number of ripe and recently spent fish were seen suggesting that spawning is occurring along the shores of Maine and New Hampshire

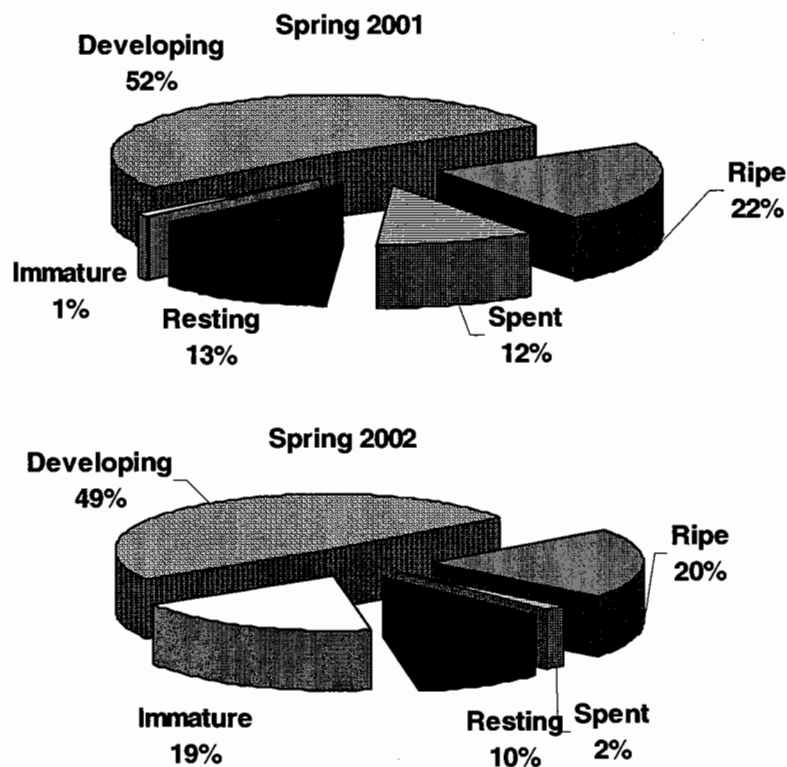


Figure 23. Maturity stages observed for yellowtail flounder in the spring surveys as percent of total individuals caught.

Winter flounder (*Pseudopleuronectes americanus*)

A fairly widespread species, winter flounder were found in 92 percent of all tows (Figure 24). Their abundance was greater to the southwest and the northeast, with the peak number found in region 5.

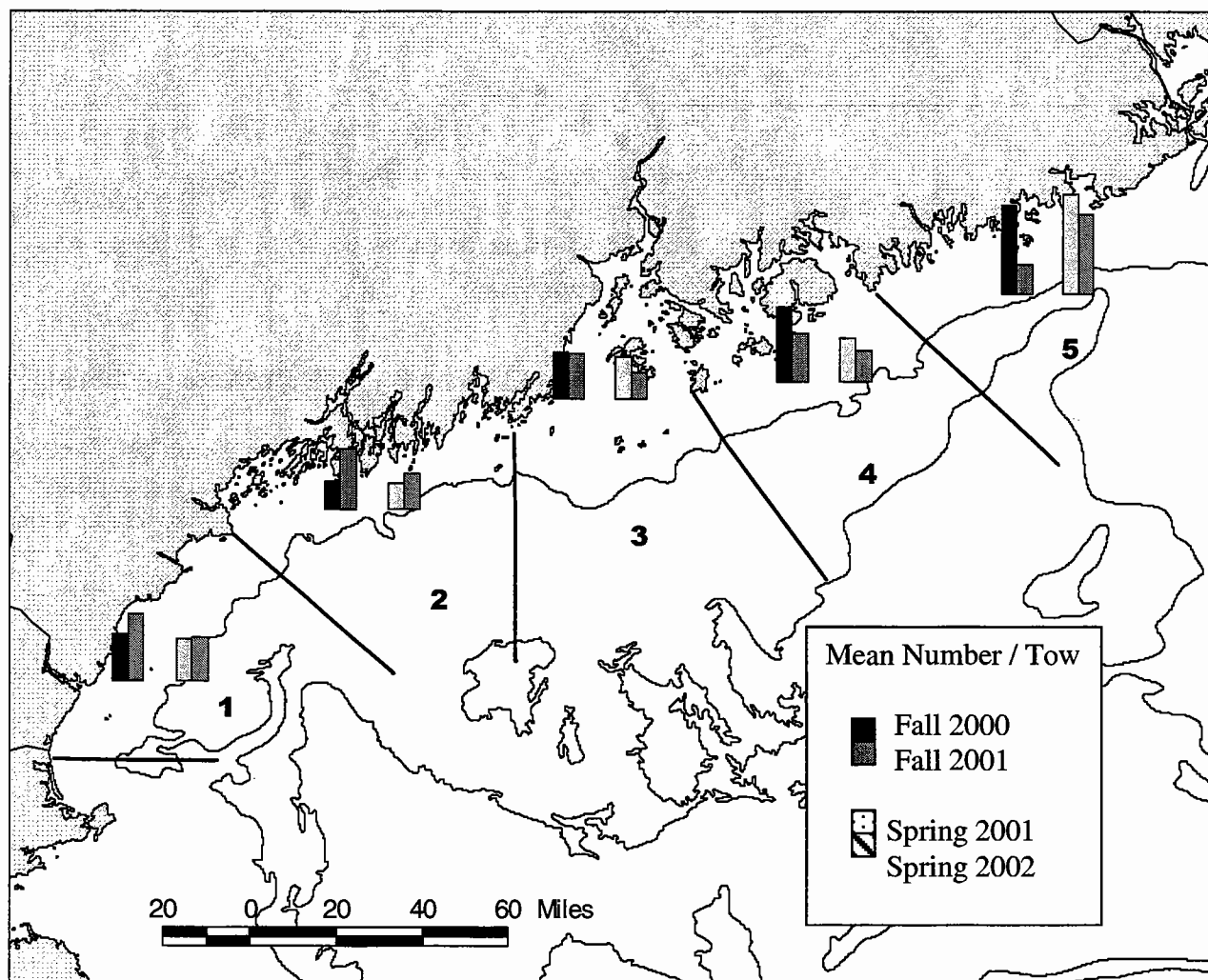


Figure 24. Abundance and distribution of winter flounder for the 2001 and 2002 survey seasons. Spring 2001 in Region 5 represented a mean of 65 individuals per tow and spring 2002 is the least at 10.

Overall for the two sampling years, there was a greater abundance of winter flounder in the two shallower strata, with a few exceptions. The low value for fall 2001 in region 5 can be attributed to the absence of tows in the two shallow strata (Figure 26). The mean size of winter flounder found all along the coast is reasonably consistent, with the majority of fish sampled as juveniles (Figure 25).

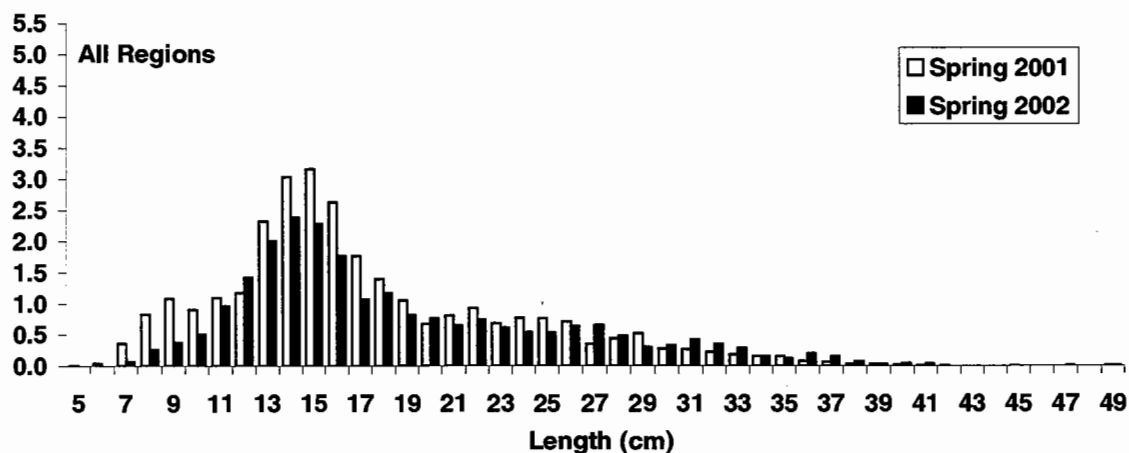
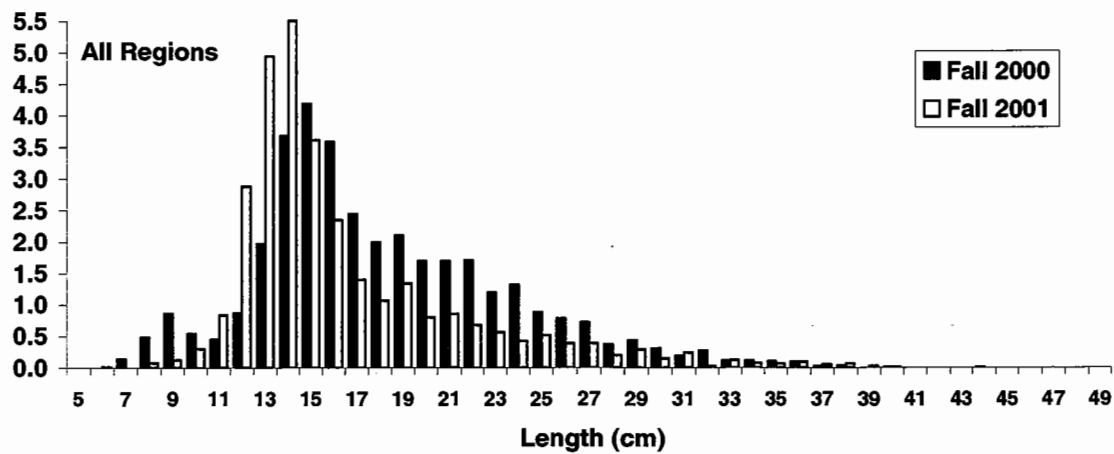


Figure 25. Total length frequencies for winter flounder by season, all strata combined.

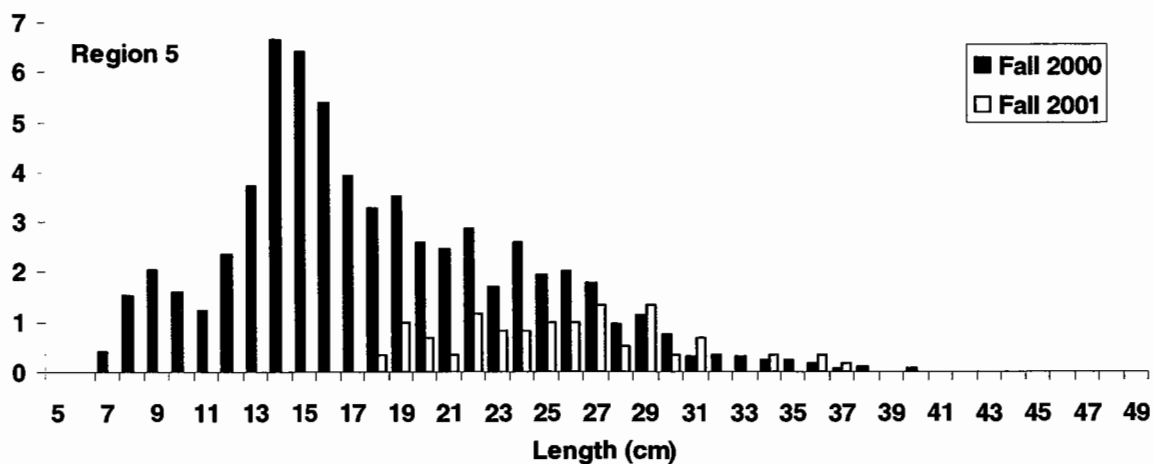


Figure 26. Mean number at length for winter flounder for fall surveys in Region 5.

The lack of fish <18 cm in region 5 for fall 2001 (Figure 26) stemmed from our inability to sample in the shallow strata in that region. In all other regions, the majority of the winter flounder 10-20 cm was caught in the shallow strata (Figure 25).

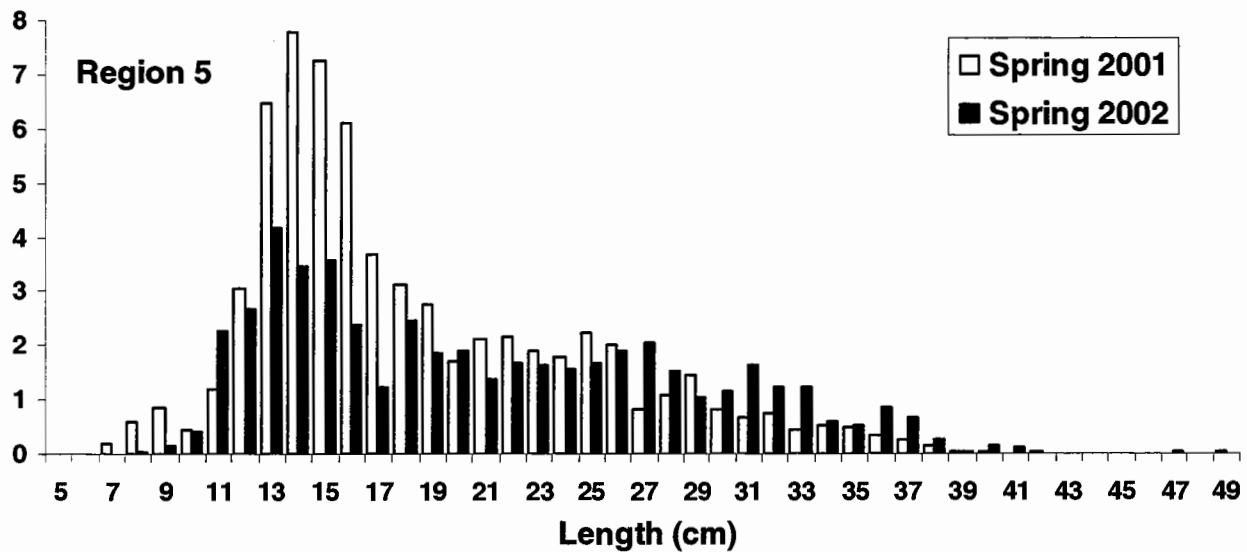


Figure 27. Mean number at length for winter flounder for spring surveys in region 5

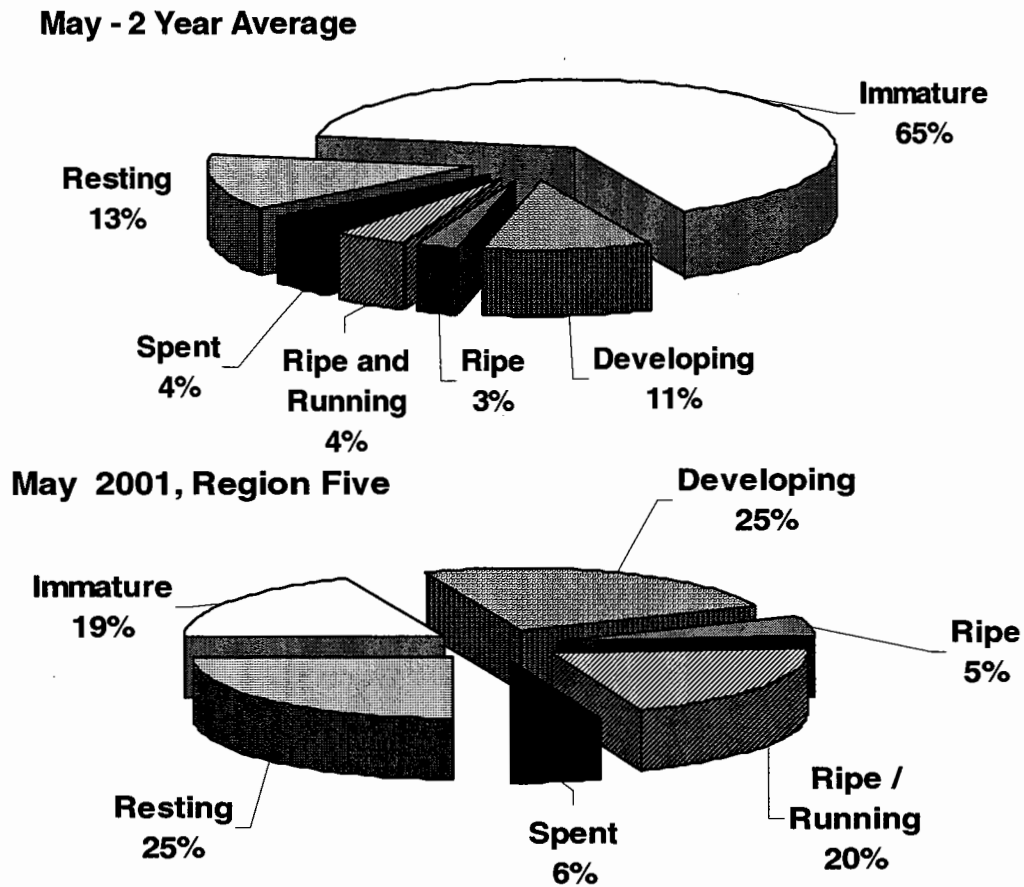


Figure 28. Maturity stages for winter flounder shown as percent of total caught. The two-year average for all strata combined is shown in the top graph with the difference in region 5 illustrated in the lower.

The percentage of mature winter flounder was greater in region 5 (Figure 28). The size distribution of fish for the spring in region 5 was similar to the size distribution for entire survey area (Figures 25 and 27). The increased incidence of adults in region 5 cannot be explained by a greater frequency of fish of a larger length (Figure 26). It is possible that they become mature at lesser lengths. Otoliths were collected and still await reading to correctly assess ages of these fish. Coast wide, adults near spawning stage were observed through the month of May. Approximately 30% of the adult fish examined in region 5 were just prior to, in, or just past spawning (Figure 28).

Goosefish (*Lophius americanus*)

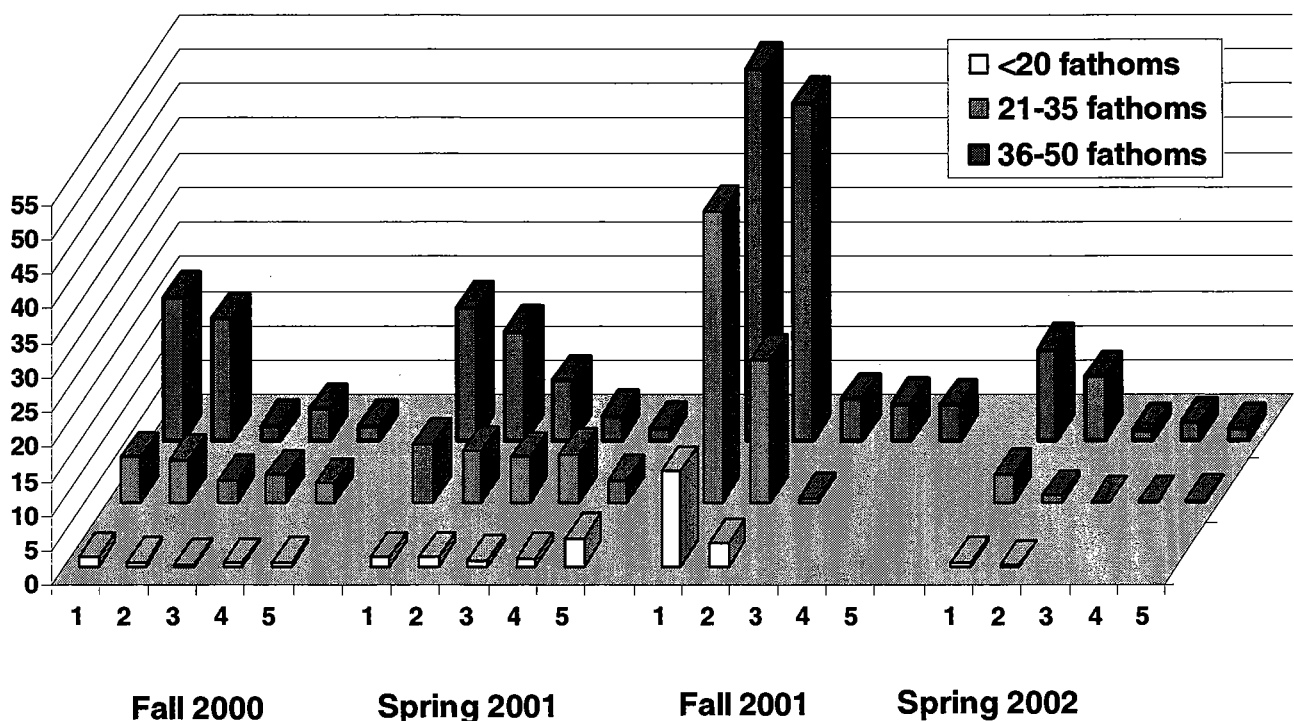


Figure 29. Distribution as mean number per 20-minute tow for goosefish for each stratum.

Goosefish (monkfish) were more numerous in southwestern coastal areas and their abundance increased with depth (Figure 29). Monkfish, as well as gray sole (Figure 30), redfish (Figure 9), young of the year haddock (Figure 16), and Jonah crab were markedly more abundant in fall 2001.

Again, mainly juvenile monkfish were represented (Figure 30). Burnett *et al* (1989) report the mean length at first maturity for monkfish as 41 cm. Less than 10% of the fish seen in the spring surveys fell at or above that size. Only two developing stage females were caught in the spring 2001 survey, not enough to properly assess timing of spawning for this species within the timeframe of this survey.

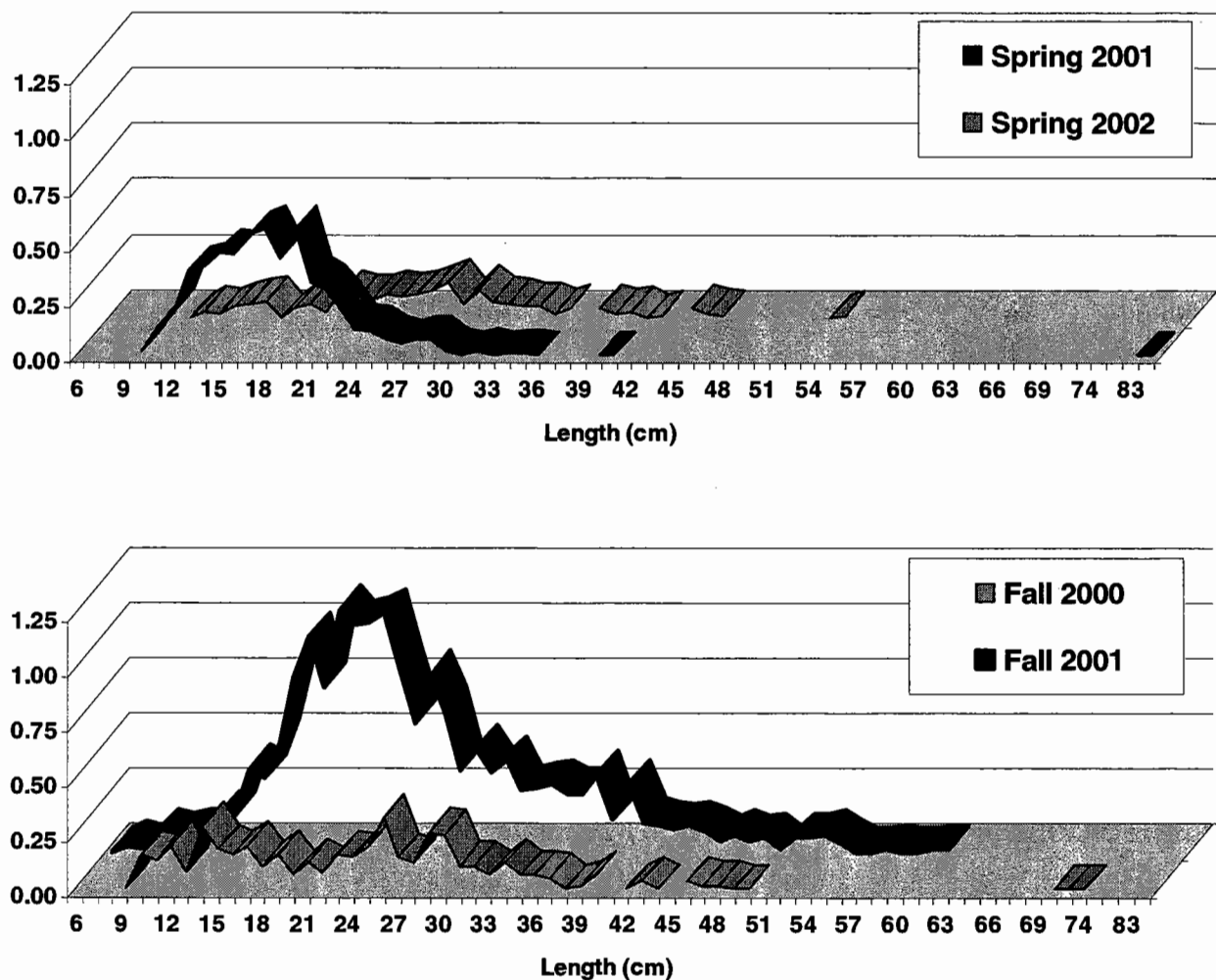


Figure 30. Mean numbers at length for goosefish by survey for all strata combined.

Witch flounder (*Glyptocephalus cynoglossus*)

Witch flounder (gray sole) were more abundant in the deeper waters and are found along the entire survey area (Figure 31). Note the coast wide increase in gray sole for the fall of 2001. Gray sole prefer mud, sandy mud, or clay substrates (Collette and Klein-MacPhee, 2002). The deeper stratum mainly consists of such habitat (Barnhardt *et al.* 1997a).

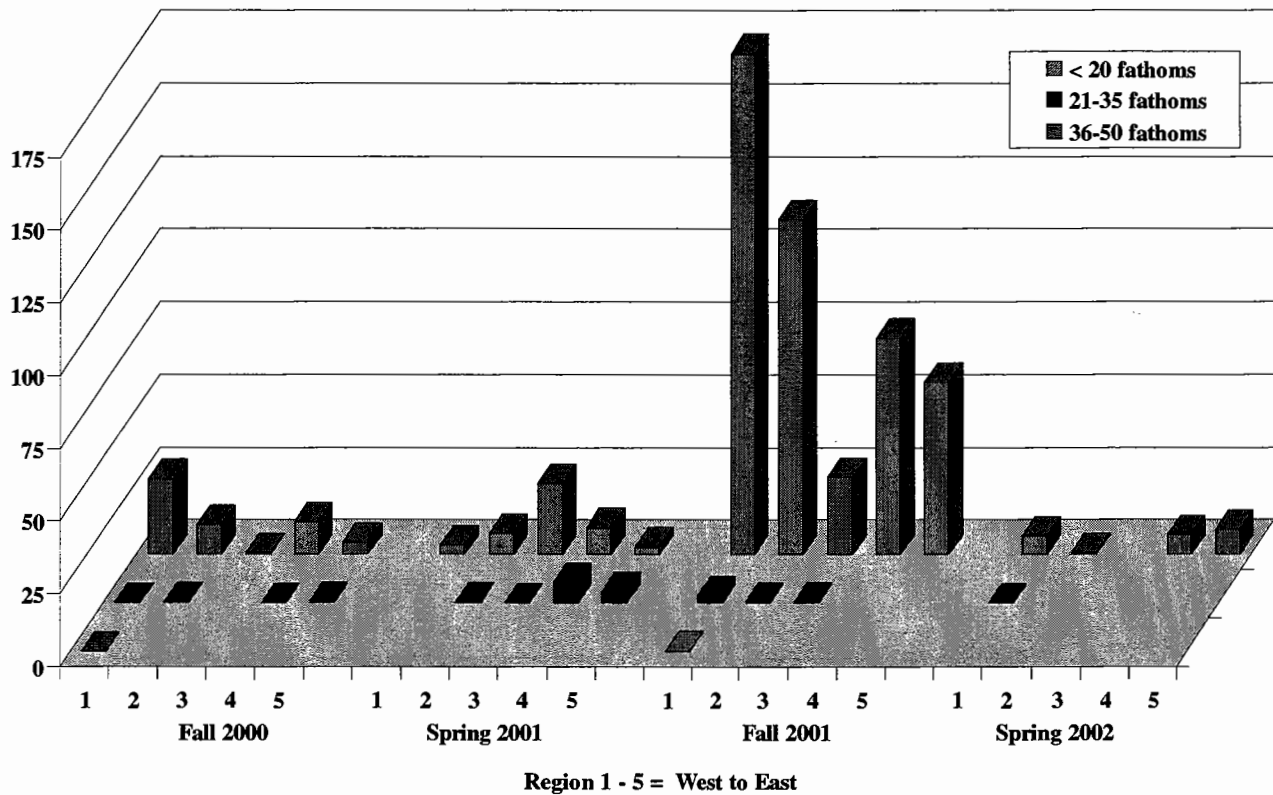


Figure 31. Distribution as mean number per tow of witch flounder along the coasts from New Hampshire to the Canadian border by survey and stratum.

In fall 2001, two distinct year classes of gray sole were seen (Figure 32). A large number of presumed 2-year old fish accounted for the large catches seen in that survey. Some gray sole larvae were found in the fall 2001 ichthyoplankton tows in region 1 (Table 3).

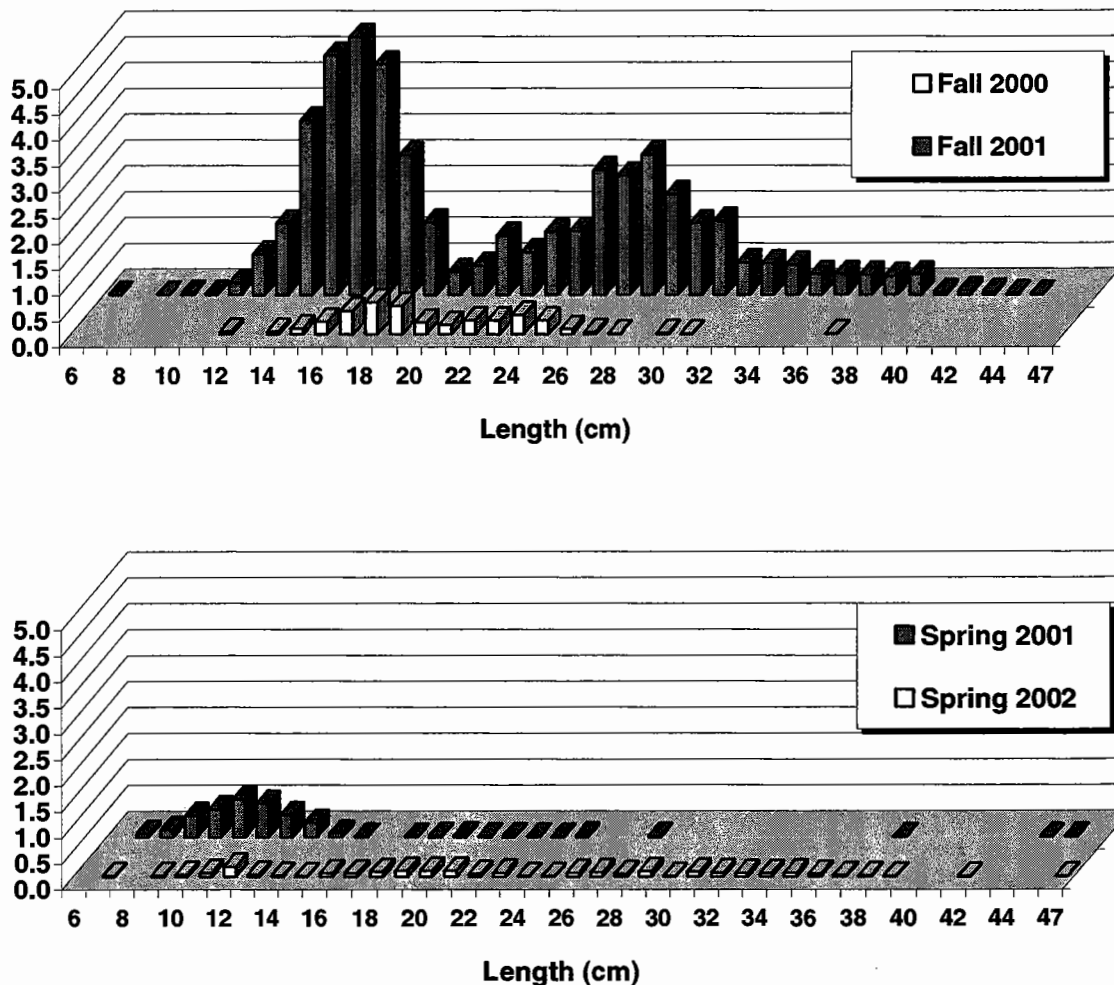


Figure 32. Mean numbers at length for witch flounder for each survey, all strata combined

The majority of the individual gray sole caught were juveniles. Three fish were near or at spawning stage in spring of 2001. In July of that year, the ripe, ripe/running, and spent fish composed 70% of the 69 fish examined. In the spring of 2002, no adult gray sole examined were near spawning stage.

Atlantic herring (*Clupea harengus*)

Herring were among the most ubiquitous species seen in the survey area and were frequently the most abundant with catches in the tens of thousands. Juveniles were most common in region 3 and 4 in the shallowest strata. The 10-15 cm juveniles were more numerous in stratum 1 and individuals >15 cm were primarily found in strata 2 and 3.

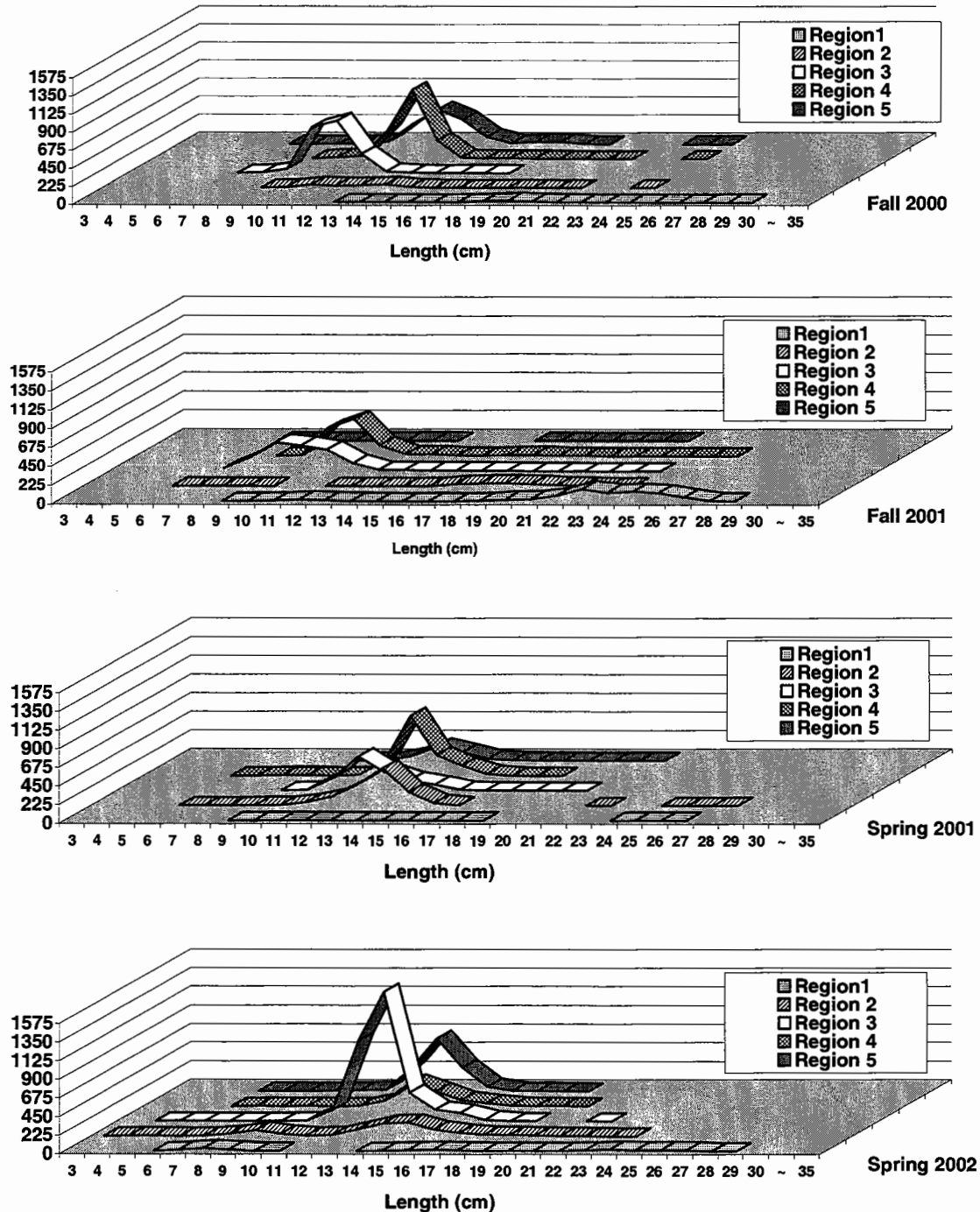


Figure 33. Mean numbers at length for herring by region, all depths combined.

Sea scallop (*Placopecten magellanicus*)

Scallops were consistently abundant throughout the survey (Figure 34). There was a reduction in numbers in spring of 2002. A large portion of the scallops caught were of legal size (Figure 35).

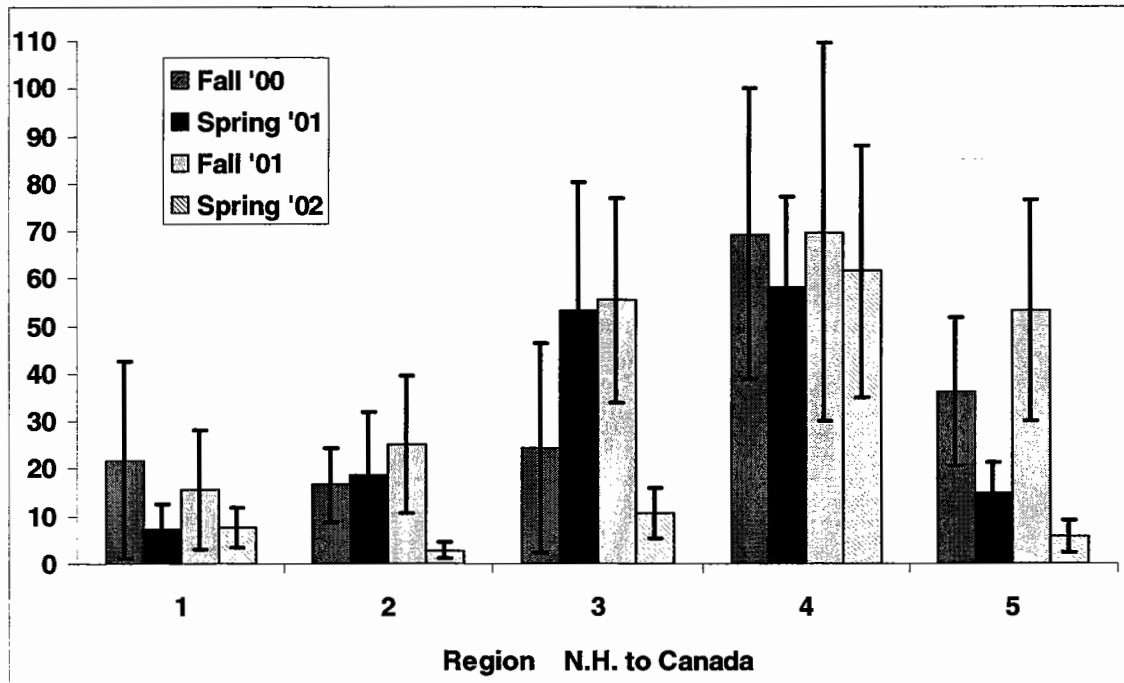


Figure 34. Distribution of scallop by region for each season. Bars represent mean number per tow with standard error.

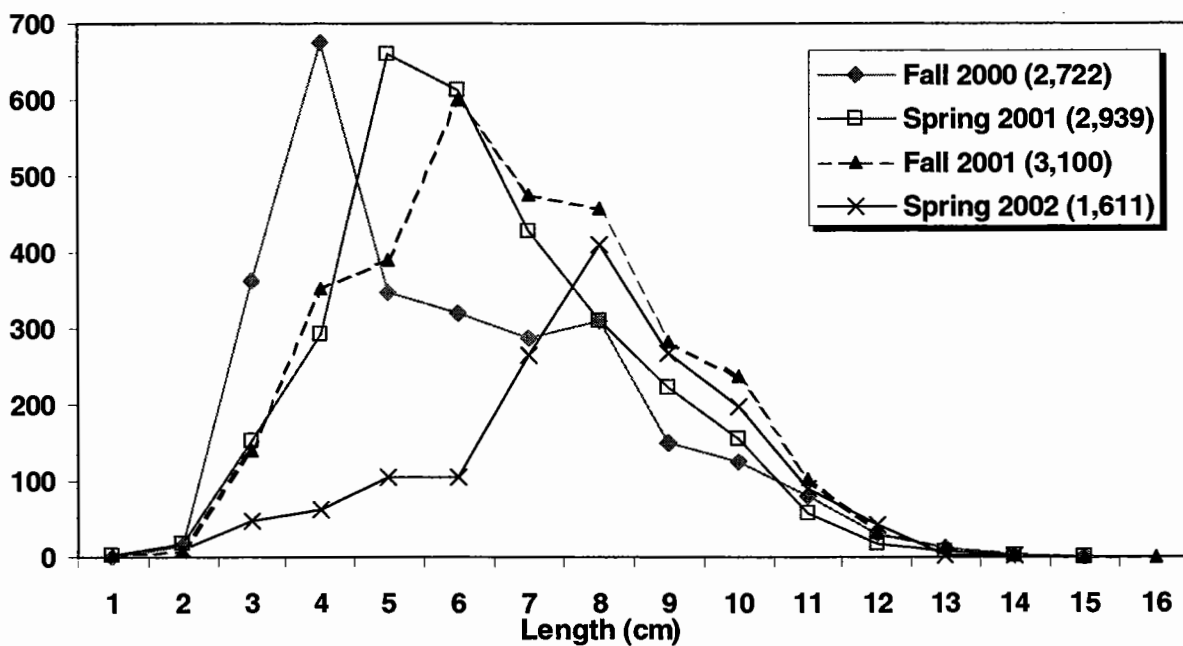


Figure 35. Length frequencies for scallop by season, all strata combined. Numbers in parentheses represent total number caught. Legal size is approximately 6 cm.

American lobster (*Homarus americanus*)

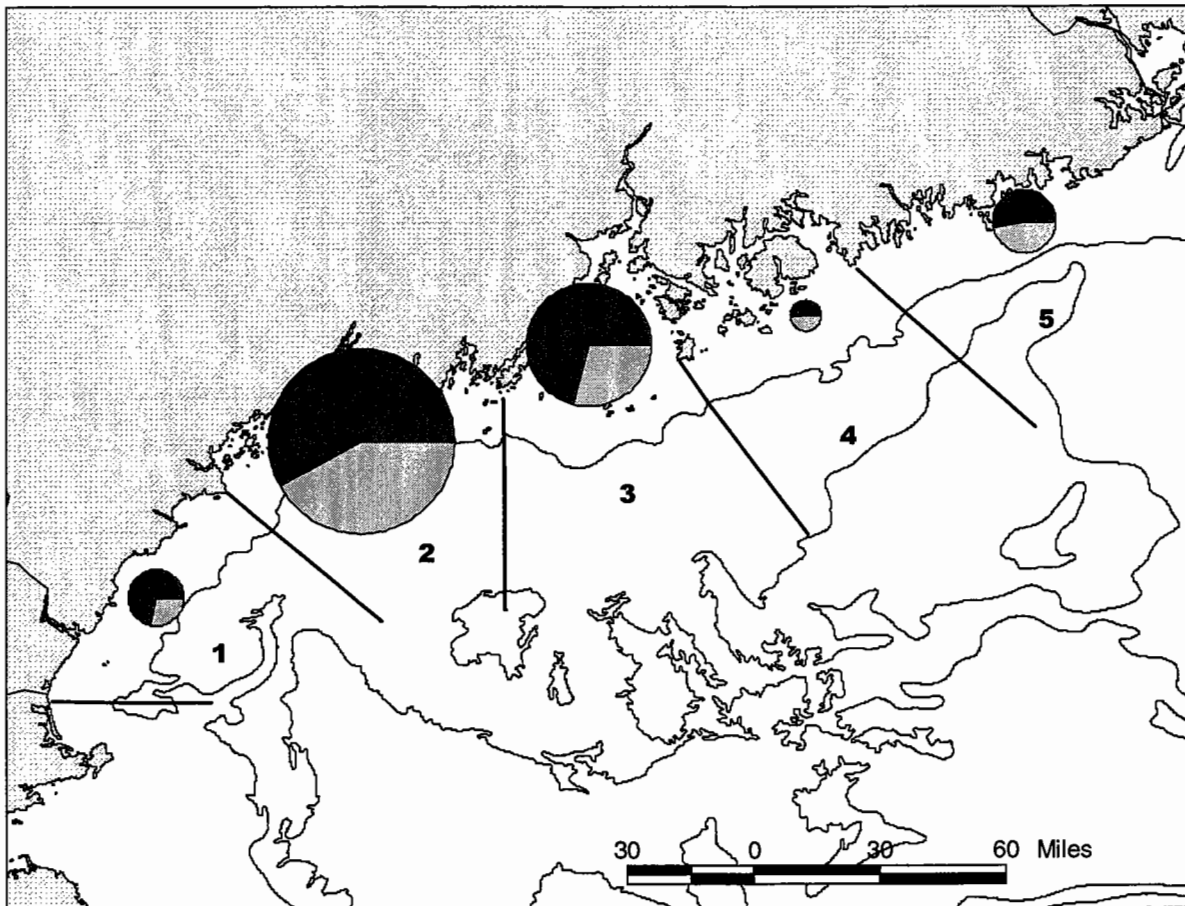


Figure 36. Relative abundance of lobster by region and season, all depths and both years combined. Fall is shown as dark gray and spring, lighter gray. The size ranges from a mean number per tow of 325 for region 2 and a low of 88 for region 4.

Lobsters continued to be one of the consistently abundant species found in the survey, equal to winter flounder caught in 92% of the tows. The mid-coast region including Penobscot Bay was consistently the area of greatest density (Figure 36). In the southwestern half of the survey area, greater abundance was seen in the fall. Towards the north and east, relative abundance of lobsters in the spring and fall surveys appears more comparable.

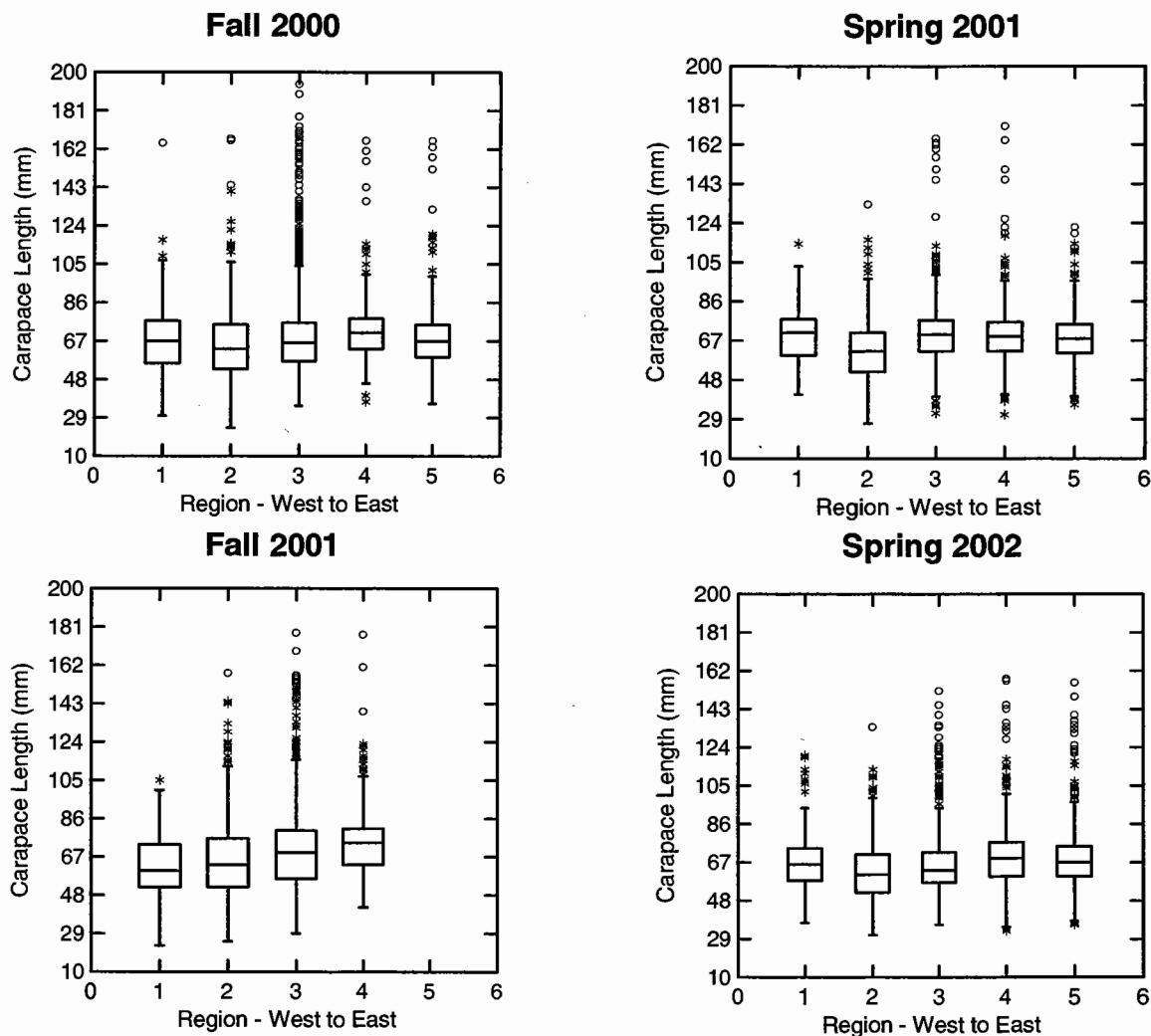


Figure 37. Box plots of lobster lengths by region for each season. The line across the box represents median length. The box represents 50 percent of the population sampled. Bars represent the hinges (1.5 times the value of the range within the box). Accepted outliers are plotted with an X and rejected outliers are plotted with an O.

The box plots in Figure 37 illustrate the relative consistency in size distribution along the coast from New Hampshire to Canada. Regional mean and median lengths were close. In fall 2001, a trend of increasing median lengths towards the eastern regions was seen. Region 2 appeared to have the smallest median size. There was a greater occurrence of larger lobsters in regions 3, 4, and 5. The absence of data for region 5 in the fall of 2001 is due to the prevention of trawl operations in this area.

Table 4. Total catch comparisons of lobsters for the two years of the survey. In parentheses are the percent of v-notched females found.

	Fall 2000	Spring 2001	Fall 2001	Spring 2002
Weight (KG)	2459.65	1387.88	2302.09	2083.57
Weight (LBS)	6589.85	3718.38	6167.72	5582.27
Number of Males	3557	2368	3826	4051
Number of Females	3543	2395	3910	4364
Number of Legal Females	888 (6%)	163 (18%)	563 (14%)	243 (13%)
Berried Females	12 (33%)	13 (38%)	10 (50%)	25 (44%)

The catch of lobster in spring 2001 was low compared to the other seasons, with total catch down about one-half (Table 4). Both sexes were fairly equally represented in all seasons, regions, and strata. The number of berried females encountered increased considerably in the spring of 2002. All berried females without a v-notch were notched before release.

Discussion

Design

The first year of the Maine New Hampshire Inshore Trawl Survey demonstrated that a survey of this magnitude and coverage is feasible. During the second year we continued to refine and improve the administrative and scientific aspects of this project.

Cooperation between New Hampshire and Maine state marine resource agencies has been an important aspect in this study. Both states are partners in the Atlantic States Marine Fisheries Commission's (ASMFC) and Northeast Area Monitoring and Assessment Program (NEAMAP). NEAMAP's mission is to provide and integrate cooperative state/federal programs to facilitate collection and dissemination of fisheries independent data in the northeast (Gulf of Maine to Cape Hatteras, NC). Both New Hampshire and Maine were responsible for the overall survey design but also relied on feedback from NMFS and University of Maine statisticians. Logistical details of the survey required significant effort on the part of both states in notifying fishermen, making travel arrangements and responding to the media interest.

Without a doubt, this project would not have been as successful without the partnership of scientists and commercial fishermen. The commercial crew could better discriminate between towable and non-towable bottom, tow in very tight areas that would not be attempted by most research captains, and were able to do so with minimal disturbance to adjacent fixed gear. Tows that appeared to be untowable on a depth sounder were towed based on the local knowledge of the Captain, crew, and other commercial fishermen. The commercial crew's ability to rapidly repair gear was also a big advantage. Because of their familiarity with the gear, they contributed significantly to assuring consistency and efficiency in trawling protocols and net performance. This relationship also benefits fisherman by providing additional income in light of recent management restrictions. It also provides an opportunity to better understand and participate in fisheries science.

Issues

The fall survey in 2001 encountered a serious problem in the area east of the Schoodic peninsula. Due to tensions created by misinformation and inadvertent contact with fixed gear, a large group of lobstermen actively protested the operations of the survey. The survey was blockaded to a standstill. Tows in region 5's, strata 1 and 2 were not conducted.

To address these issues and avoid reoccurring problems, we held a number of individual small group meetings. Several concerns were presented at these meetings:

- Effects of the trawling operation (net and doors) on the bottom habitat and on lobsters
- Lobster handling procedures onboard the vessel
- Timing of the survey
- Underestimation of seed lobsters due to low catch of egg-bearing females
- Release to the public of tow specific data
- Protocols on removing inadvertently snagged traps and/or buoys
- Utilization of 'birds' (stabilizing outriggers) while steaming close to shore
- Communication problems, notification and scheduling

To date, we have discussed all of these issues and addressed most. Lobster handling, gear handling, communication, and modes of navigating between stations have been modified. The fall 2002 survey was postponed by three weeks to minimize gear conflict.

The several shorter surveys originally planned to look at the timing of both the spring and fall surveys were modified. Logistically, the number of shorter cruises was impractical. Therefore, summer and winter seasonal assessments were planned, with the remaining days to be utilized for catch efficiency work in August. The summer cruise was completed in July. Because of the local opposition to the survey, it became apparent that unless we addressed these concerns, the survey as a whole would be compromised. The winter study was cancelled and two other periods were utilized for camera work, net mensuration, and diver participation.

Findings

With two years of the time series completed, some anomalies have appeared as well as consistencies. Trends are not yet distinguishable and such differences may be considered noise as the time series develops and abundance can be assessed over a sampling year rather than by season. When a sufficient time series is available, more rigorous statistical analysis will be possible. The inability to complete the survey as a whole adds unnecessary bias to the data.

The fall survey provides good information on dogfish, red hake, white hake, silver hake, monkfish and gray sole as they are consistently more abundant at that time of year (Sherman, unpublished). The fall 2001 survey catches of these species, along with Jonah crab and redfish stand out as unusual when compared to the pilot year. Atlantic menhaden and scup were seen in large numbers in the fall of 2000 but absent in 2001. With the continuing time series, these findings will either become significant or be lost in the variance of this dynamic system.

Spring 2001 bottom temperatures observed during the survey were about 2° C lower than spring 2002 (see Appendix A), which could account for the greater number of spawning winter flounder in spring 2001 and an increase in spawning cod in spring 2002 (Collette and Klein-MacPhee, 2002). Lobster abundance in spring 2001 was approximately half the number seen in spring 2002. This is congruous with what is known of lobster behavior and temperature (Aiken and Waddy, 1986).

The sampling in July gave us a snapshot of summer assemblages. Time constraints only allowed 30 tows, which could in itself affect the comparisons to the fall surveys. Fish tend to occur in pockets and the decreased sampling density in July could account for the perception that catches were smaller. There were fewer occasions to encounter these pockets with fewer stations. Therefore, we cannot conclude whether the lower abundance seen in July was real or due to the sampling scheme and the timing of the survey. However, length frequency distributions were comparable. Additional studies need to be conducted in order to draw any sound conclusions. One conclusion was that our spring and fall surveys might benefit by adding an additional stratum up to 80 fathoms due the higher incidence of larger fish seen in the July stations at greater depths. A more complete picture of populations could be afforded by this expansion, helping to clarify spawning grounds and timing as well as juvenile habitat.

The August study looked at the effects of tidal current on the sampling gear. Observations suggested that towing this research net into strong currents too fast might decrease the diversity and number of individuals caught. Real-time underwater video observations have confirmed that towing into currents and not slowing the boat down considerably to compensate for the currents' forces will cause the net to "lift off" up from the seafloor (Sherman, pers. comm.). Likewise, it was observed that towing across the path of a strong current decreases door spread, which causes the fishing area of the trawl to become smaller. Also, towing with the current too slowly causes the net to "dig in" to the bottom unnecessarily. Conclusions from this study were to tow the net with the tide whenever possible. Due to the limited scope of this particular study, more work is needed to acceptably answer the question of towing against the tide.

The camera work performed in February 2002 is reported in a video supplement provided with this report. Observations showed that the trawl net and doors caused minimal habitat and fauna damage.

The survey can provide information beneficial for management of the system and not focus solely on a select suite of target species. Atlantic herring are an important source of bait for the lobster fishery as well as being utilized for food. Silver hake (whiting) for example, have recently been approved for an exempted area small mesh fishery in the Gulf of Maine. This survey could provide baseline data and, in the future, trend line analysis for proper management of this effort. Also, information gathered could be applied on an ecological community level. Sculpins, cartilaginous species, and predator-prey ratios, for example, have been used as indicators of system-wide health. Landings data do not include information on these species. Over the long term, system shifts as a result of climate change may be assessed as exemplified when the surveys encountered species such as black sea bass, scad, bob-tail squid, and scup that historically have not been common north of Cape Ann, Massachusetts (Collette and Klein-MacPhee, 2002).

Recommendations

Clearly the most important recommendation is to secure funding to develop an adequate time series sufficient for groundfish stock assessment and resolve remaining technical and political issues that constrain the survey's potential. Conventionally, a data set of, at the least three years, and preferably 5 years, of consistent sampling is required before much analysis of fish stock status can be done. Much needs to be done before the data can be used for management decisions and much can be added to the project at minimal cost to further add value to the project.

Such tasks include the following:

- complete a manual of Methods and Procedures
- conduct side by side gear comparisons
- continue to work with fixed gear fishermen to improve cooperation
- improve efficiency of cruise data entry and analysis
- continue ichthyoplankton collection and analysis for information on spawning
- continue to collect otoliths, scales and conduct maturation studies
- conduct a workshop with NMFS and MA DMF on data and survey design
- acquire net mensuration equipment to assure survey consistency

References

- Aiken, D.E. and Waddy, S.L. 1986. Environmental Influence on Recruitment of the American Lobster, Homarus americanus: A Perspective. Can. J. Fish. Aquat. Sci. , Vol. 43.
- Azarovitz, T.R. 1994. Northeast Fisheries Science Center Bottom Trawl Surveys. In: Atlantic States Marine Fisheries Commission. 1994. Proceedings of the Workshop on the Collection and Use of Trawl Survey Data for Fisheries Management. Special Report No. 35.
- Barnhardt, W.A, Kelley, J.T., Dickson, S.M., Belknap, D.F. and Kelly, A.R. 1997a. Surficial Geology of the Maine Inner Continental Shelf (map series). Maine Geological Survey, Natural Resources Information and Mapping Center, scale (1:100,000). Augusta, ME.
- Bigelow, H.B. and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. Fishery Bulletin of the Fish and Wildlife Service Vol. 53. Washington, D.C.
- Collette, B.B., Klein-MacPhee, G., Eds. 2002. Bigelow and Schroeder's Fishes of the Gulf of Maine 3rd ed., Smith. Inst. Press. Washington, D.C.
- Correia, S.J. 1994. Massachusetts Inshore Bottom Trawl Survey. In: Atlantic States Marine Fisheries Commission. 1994. Proceedings of the Workshop on the Collection and Use of Trawl Survey Data for Fisheries Management. Special Report No. 35.
- Gosslein, M.G. 1969. Groundfish survey program of BCF Woods Hole. Commercial Fisheries, Review 31 (8-9): 22-35.
- Rich, W.H. 1929. Fishing Grounds of the Gulf of Maine. Report of the United States Commissioner of Fisheries, for the Fiscal Year 1929. U.S. Department of Commerce, Bureau of Fisheries. Washington, D.C.
- Sherman, S.A., Lardie, J., Lazzari, M. 1999. Spring 1999 Groundfish Maturation Study: Final Report to Economic Development Administration. Grant No. 01-69-03883. U.S. Department of Commerce. Philadelphia, PA.
- Sowles, J., Sherman, S.A., Smith, H., Grout, D.E., Perkins, D.W. Jr., Tetrault, R. and Rice, C. 2002. Fall 2000 and Spring 2001 Maine-New Hampshire Inshore Trawl Survey, Final Report to the Northeast Consortium. Maine Department of Marine Resources, Technical Research Document 02/2.
- Steneck, R.S. and C.J. Wilson. 2001. Large-scale and long-term, spatial and temporal patterns in demography and landings of the American lobster, Homarus americanus, in Maine. Mar. Freshwater Res. Vol. 52: 1303-19.

Appendix A **Individual Station Descriptions**

DATE	REGION	GRID	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
Fall 2001											
9/24/01	1	472	13754.60	25965.10	4256.021	7044.991	745	20	14.5		
			13761.10	25965.00	4255.460	7045.506					
9/24/01	1	513	13751.60	25926.70	4252.738	7041.756	921	20	28.5		
			13743.10	25927.20	4253.491	7041.099					
9/24/01	1	546	13739.40	25911.50	4252.366	7039.568	1100	20	33.85		
			13747.90	25911.20	4251.631	7040.247					
9/24/01	1	543	13773.60	25935.00	4251.650	7044.191	1225	20	18.65		
			13779.80	25931.40	4250.795	7044.418					
9/25/01	1	Z-4	13561.70	25872.90	4302.991	7021.384	823	20	64.3		
			13570.70	25874.90	4302.485	7022.332					
9/25/01	1	411	13620.20	25892.10	4300.224	7028.020	1031	21	51		
			13612.50	25893.10	4300.923	7027.450					
9/26/01	1	170	13530.30	26008.40	4318.220	7030.572	725	20	18.05		
			13537.00	26005.90	4317.455	7030.893					
9/26/01	1	171	13527.40	26001.20	4317.759	7029.703	832	18	18		
			13534.50	26000.50	4317.136	7030.217					
9/26/01	1	305	13533.00	25916.30	4309.266	7022.704	1109	20	47.55		
			13541.20	25917.20	4308.719	7023.475					
9/26/01	1	454	13639.90	25876.80	4257.255	7028.428	1527	21	53.55		
			13631.90	25874.50	4257.676	7027.557					
9/26/01	1	468	13659.80	25883.60	4256.297	7030.675	1648	18	47.6		
			13650.70	25885.00	4257.152	7030.018					
9/27/01	1	123	13384.90	25932.90	4321.994	7011.627	932	20	55		
			13389.10	25939.00	4322.275	7012.564					
9/27/01	1	100	13349.00	25928.70	4324.224	7008.155	1116	18	58.8		
			13347.20	25921.20	4323.623	7007.273					
9/27/01	1	71	13379.40	25962.00	4325.230	7013.939	1318	20	46.5		
			13369.30	25962.30	4326.008	7013.121					
9/27/01	1	68	13400.80	25980.40	4325.421	7017.475	1501	19	29.5		
			13392.60	25980.50	4326.046	7016.805					
9/28/01	1	5	13355.60	26012.50	4331.943	7016.831	923	20	13.05		
			13348.50	26008.10	4332.039	7015.825					
9/28/01	1	35	13374.20	25988.80	4328.232	7016.076	1106	15	24		
			13373.20	25993.30	4328.747	7016.426					
10/1/01	2	367	13186.80	25970.40	4340.084	6958.539	939	20	20.35		
			13196.00	25965.80	4338.962	6958.838					
10/1/01	2	556	13265.60	25937.50	4331.140	7001.863	1144	20	55.25		
			13256.90	25937.60	4331.776	7001.127					
10/1/01	1	27	13341.60	25980.10	4329.800	7012.526	1355	20	34		
			13332.50	25980.50	4330.512	7011.805					
10/2/01	2	484	13201.40	25934.40	4335.425	6956.006	848	21	48.9		
			13207.10	25939.90	4335.571	6957.077					
10/2/01	2	461	13184.00	25930.00	4336.214	6954.027	1023	21	47.75		
			13191.50	25927.90	4335.473	6954.460					
10/2/01	2	463	13164.10	25921.90	4336.797	6951.424	1205	22	43.5		
			13173.30	25922.00	4336.161	6952.243					

Appendix A **Individual Station Descriptions**

DATE	REGION	GRID	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
10/2/01	2	375	13131.20	25921.80	4339.088	6948.518	1444	20	19.5		
			13123.20	25922.60	4339.728	6947.900					
10/2/01	2	266	13075.90	25918.30	4342.569	6943.236	1604	15	25.25		
			13082.90	25918.10	4342.065	6943.836					
10/3/01	2	131	13038.00	25934.10	4346.815	6941.670	721	22	28		
			13044.70	25930.50	4345.980	6941.850					
10/3/01	2	336	13140.90	25939.70	4340.230	6951.310	1001	20	16		
			13132.70	25941.40	4340.979	6950.781					
10/3/01	2	335	13145.90	25945.00	4340.417	6952.317	1140	25	14.8		
			13148.60	25950.60	4340.795	6953.154					
10/3/01	2	264	13096.80	25924.70	4341.779	6945.803	1348	20	14.75		
			13093.50	25929.70	4342.521	6946.067					
10/3/01	2	265	13086.00	25923.00	4342.354	6944.660	1627	20	13.5		
			13080.30	25926.80	4343.139	6944.580					
10/4/01	2	194	13039.70	25908.90	4344.086	6938.929	745	21	34.7		
			13032.60	25912.00	4344.894	6938.647					
10/4/01	2	236	13006.80	25971.00	4352.807	6943.199	1032	20	59.5		
			12998.00	25973.90	4353.720	6942.778					
10/4/01	2	X-5	12988.70	25875.50	4344.062	6930.369	1232	24	59		
			12981.30	25880.30	4345.064	6930.256					
10/5/01	2	240	12958.50	25849.70	4343.364	6924.443	913	21	51.85		
			12967.40	25848.40	4342.635	6925.128					
10/5/01	2	55	12936.80	25903.30	4350.481	6928.953	1106	20	35.95		
			12942.50	25899.40	4349.685	6928.997					
10/5/01	2	41	12946.70	25918.30	4351.397	6931.671	1255	20	20.4		
			12952.00	25913.70	4350.553	6931.592					
10/8/01	3	399	12792.40	25823.10	4351.365	6904.984	939	30	33.4	10.06	32.69
			12785.40	25826.50	4352.191	6904.756					
10/8/01	3	497	12829.60	25813.20	4347.874	6907.340	1120	22	46.05	9.3	32.88
			12820.00	25816.40	4348.845	6906.813					
10/8/01	3	570	12847.70	25802.50	4345.537	6907.723	1422	15	49.85		
			12854.20	25800.00	4344.845	6908.042					
10/9/01	3	4	12503.10	25913.20	4420.228	6849.885	846	20	25.25	12.39	31.69
			12510.40	25909.90	4419.377	6850.076					
10/9/01	3	14	12550.10	25907.10	4416.465	6853.465	1000	21	14.9	11.5	32.49
			12542.10	25909.60	4417.270	6853.075					
10/9/01	3	317	12780.00	25851.50	4355.282	6907.627	1504	20	19.75	11.05	32.54
			12772.10	25852.70	4355.930	6907.028					
10/10/01	3	501	12803.30	25797.30	4347.830	6902.556	834	20	40.95	9.73	32.84
			12795.10	25799.80	4348.632	6902.067					
10/10/01	3	W-4	12842.30	25720.90	4336.893	6856.128	1206	20	68	9.03	33.04
			12851.20	25719.10	4336.134	6856.831					
10/10/01	3	564	12700.50	25731.50	4346.957	6842.332	1515	19	56.9	8.9	33.12
			12707.50	25730.70	4346.428	6842.976					
10/11/01	3	143	12586.50	25835.10	4405.986	6846.114	829	20	13.95		
			12583.50	25840.30	4406.767	6846.605					
10/11/01	3	96	12566.20	25855.60	4409.613	6847.207	1138	19	8.1		
			12565.40	25860.70	4410.241	6847.908					

Appendix A **Individual Station Descriptions**

DATE	REGION	GRID	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
10/11/01	3	121	12565.10	25843.20	4408.281	6845.190	1256	21	27.45		
			12559.70	25847.90	4409.161	6845.370					
10/12/01	3	359	12668.80	25774.10	4353.809	6845.346	735	23	49.6		
			12660.30	25778.60	4354.858	6845.129					
10/12/01	3	364	12618.40	25756.70	4354.995	6837.274	932	18	48.8		
			12627.90	25758.00	4354.549	6838.507					
10/12/01	3	338	12620.50	25759.70	4355.210	6837.972	1100	20	48.7		
			12626.40	25763.90	4355.323	6839.266					
10/15/01	4	492	12559.30	25772.20	4400.514	6833.336	810	10	41	9.31	32.99
			12549.90	25772.60	4401.154	6832.381					
10/15/01	4	575	12553.40	25735.90	4356.650	6826.706	1022	20	56.85		
			12560.50	25731.40	4355.678	6826.756					
10/15/01	4	250	12482.30	25812.40	4410.064	6831.678	1353	20	13.45		
			12491.30	25812.10	4409.454	6832.583					
10/16/01	4	100	12430.50	25842.50	4416.868	6831.256	735	20	16.75	12.53	32.14
			12429.50	25836.70	4416.261	6830.175					
10/16/01	4	58	12416.80	25860.80	4419.863	6832.908	856	20	17.35	12.4	31.69
			12422.60	25856.70	4419.016	6832.818					
10/16/01	4	31	12383.60	25859.40	4421.852	6829.252	1031	15	12		
			12380.50	25863.60	4422.538	6829.650					
10/16/01	4	175	12438.60	25807.60	4412.305	6826.190	1300	19	15.45		
			12430.20	25807.10	4412.785	6825.196					
10/18/01	4	2	12264.60	25841.30	4427.490	6813.417	844	21	10.9	11.45	32.51
			12256.20	25840.60	4427.957	6812.373					
10/18/01	4	7	12269.30	25830.20	4425.888	6811.848	1002	21	24.9		
			12259.80	25830.60	4426.555	6810.879					
10/19/01	4	94	12308.20	25784.30	4417.955	6807.531	1019	21	35.15	10.43	32.7
			12315.30	25780.60	4417.057	6807.640					
10/19/01	4	55	12282.10	25795.80	4421.008	6806.750	1126	20	32.15	10.7	32.64
			12288.10	25791.90	4420.158	6806.686					
10/19/01	4	482	12452.60	25724.60	4401.574	6813.101	1522	20	55.9	9.24	33.1
			12444.90	25726.50	4402.283	6812.538					
10/19/01	4	479	12477.00	25736.60	4401.505	6818.116	1653	23	51.8	9.18	33.07
			12469.00	25735.00	4401.813	6816.907					
10/20/01	4	438	12416.90	25720.20	4403.256	6808.029	831	20	55.5	8.94	33.4
			12406.90	25722.30	4404.137	6807.227					
10/20/01	4	V-4	12393.20	25709.00	4403.388	6803.066	1017	20	61.7	8.92	33.27
			12400.90	25709.00	4402.894	6803.985					
10/20/01	4	300	12329.60	25715.60	4408.287	6756.697	1214	20	55.7	9.35	33.06
			12337.90	25714.80	4407.657	6757.548					
10/20/01	4	268	12347.70	25728.80	4408.734	6801.474	1333	21	51.55	9.25	33.09
			12342.60	25726.00	4408.722	6800.318					
10/20/01	4	165	12332.60	25754.00	4412.759	6804.564	1512	20	42.5		
			12330.00	25750.00	4412.443	6803.489					
10/22/01	5	606	12272.20	25740.10	4414.959	6754.611	842	21	37.75		
			12280.00	25740.60	4414.517	6755.659					
10/23/01	5	U-4	12147.90	25699.20	4418.018	6729.729	800	20	58.7		
			12156.90	25699.10	4417.412	6730.928					

Appendix A **Individual Station Descriptions**

DATE	REGION	GRID	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
10/23/01	5	566	12190.70	25722.90	4418.153	6740.774	946	21	47.9		
			12184.90	25720.20	4418.199	6739.426					
10/23/01	5	540	12195.00	25733.10	4419.123	6743.550	1101	20	44.7		
			12192.90	25728.90	4418.746	6742.370					
10/25/01	5	423	12015.30	25676.20	4424.085	6704.865	1100	20	70.8		
			12021.00	25677.00	4423.791	6705.948					
10/25/01	5	389	12006.40	25671.40	4424.094	6702.188	1212	22	67.25		
			12013.40	25668.20	4423.196	6702.391					

Spring 2002

5/6/02	1	529	13775.40	25939.10	4251.898	7044.657	1014	20	20.00	5.50	32.30
			13768.30	25940.20	4252.569	7044.188					
5/6/02	1	532	13735.70	25914.60	4252.970	7039.513	1143	23	34.00	5.10	32.55
			13744.50	25916.50	4252.414	7040.388					
5/6/02	1	495	13720.70	25920.00	4254.703	7038.714	1323	20	31.35	5.23	32.48
			13728.80	25922.00	4254.216	7039.542					
5/6/02	1	472	13757.40	25965.10	4255.752	7045.260	1505	21	14.00	5.79	32.05
			13750.50	25966.70	4256.470	7044.825					
5/7/02	1	417	13692.50	25947.10	4259.451	7038.600	835	20	13.30	5.65	32.18
			13700.50	25946.90	4258.844	7039.162					
5/7/02	1	451	13649.40	25896.90	4258.345	7030.919	1154	20	46.75	5.04	32.61
			13655.50	25894.60	4257.676	7031.242					
5/7/02	1	424	13626.60	25895.70	4300.074	7028.876	1420	21	49.80	5.03	32.55
			13618.20	25895.50	4300.707	7028.148					
5/7/02	1	396	13605.60	25900.00	4302.103	7027.452	1607	20	50.50	5.05	32.56
			13597.10	25899.30	4302.726	7026.682					
5/8/02	1	305	13539.50	25916.80	4308.827	7023.293	845	20	48.45	5.01	32.66
			13532.00	25917.20	4309.446	7022.723					
5/8/02	1	282	13505.90	25902.80	4310.066	7019.224	1128	20	57.35	5.04	32.71
			13509.90	25909.30	4310.390	7020.114					
5/8/02	1	171	13528.30	26001.20	4317.660	7029.787	1411	20	18.00	5.62	32.24
			13535.00	26001.70	4317.178	7030.354					
5/8/02	1	246	13580.90	25992.10	4312.664	7033.237	1606	20	17.20	5.64	32.29
			13582.30	25986.50	4312.031	7032.876					
5/9/02	1	110	13375.90	25943.70	4323.730	7011.887	1224	20	55.05		
			13377.20	25937.60	4323.043	7011.444					
5/9/02	1	100	13349.50	25927.60	4324.092	7008.090	1421	20	58.70		
			13345.50	25921.40	4323.781	7007.150					
5/9/02	1	68	13401.00	25980.00	4325.362	7017.442	1639	20	32.00		
			13393.20	25980.40	4325.989	7016.826					
5/9/02	1	21	13388.60	26017.90	4329.990	7020.024	1810	19	9.50	5.63	32.23
			13394.00	26016.70	4329.461	7020.352					
5/10/02	1	27	13338.60	25981.90	4330.212	7012.437	739	20	32.46		
			13330.50	25980.60	4330.680	7011.634					
5/10/02	1	38	13346.20	25975.70	4329.045	7012.476	940	20	34.00		
			13339.00	25974.30	4329.431	7011.732					

Appendix A Individual Station Descriptions

DATE	REGION	GRID	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
5/10/02	1	45	13394.90	26005.90	4328.338	7019.371	1137	20	17.66		
			13394.20	26000.20	4327.896	7018.836					
5/13/02	2	556	13262.50	25936.80	4331.310	7001.515	731	20	52.85	5.00	32.61
			13255.40	25937.40	4331.884	7000.972					
5/13/02	2	363	13222.40	25988.10	4339.301	7003.367	1112	13	24.60	5.31	32.02
			13221.40	25990.90	4339.652	7003.578					
5/13/02	2	362	13237.80	25997.00	4339.082	7005.576	1244	20	19.50	6.80	31.43
			13231.20	25996.80	4339.540	7005.016					
5/15/02	2	126	13179.50	26028.80	4346.502	7004.084	804	21	7.75	7.87	30.95
			13187.80	26028.20	4345.914	7004.630					
5/15/02	2	331	13190.50	25967.10	4339.491	6958.493	1022	20	28.70	6.11	31.74
			13184.60	25969.70	4340.156	6958.269					
5/15/02	2	484	13213.40	25937.10	4334.834	6957.314	1236	20	52.10	5.00	32.27
			13206.60	25933.90	4335.003	6956.391					
5/15/02	2	463	13173.60	25922.40	4336.176	6952.297	1449	20	44.60	5.02	31.11
			13165.90	25922.30	4336.711	6951.619					
5/15/02	2	375	13122.00	25920.10	4339.550	6947.504	1638	20	21.20	6.02	31.79
			13128.00	25918.00	4338.912	6947.808					
5/15/02	2	265	13084.20	25923.40	4342.501	6944.533	1821	20	18.55	6.52	31.64
			13088.80	25919.70	4341.810	6944.525					
5/16/02	2	440	13121.80	25901.30	4337.646	6945.422	759	20	47.70	5.01	32.20
			13122.10	25896.20	4337.104	6944.896					
5/16/02	2	307	13070.20	25902.20	4341.312	6940.925	1112	20	39.00	5.36	32.00
			13066.60	25906.00	4341.950	6941.008					
5/16/02	2	256	13162.10	25975.70	4342.367	6956.980	1353	16	20.20	6.01	31.79
			13159.80	25972.10	4342.181	6956.403					
5/16/02	2	219	13141.70	25970.30	4343.283	6954.680	1521	20	13.10	6.31	31.70
			13148.40	25968.50	4342.630	6955.066					
5/16/02	2	84	13030.10	25940.20	4348.010	6941.688	1853	20	24.66	5.88	31.78
			13034.00	25936.70	4347.364	6941.602					
5/17/02	2	194	13031.90	25915.30	4345.290	6938.962	646	20	32.16	5.20	27.93
			13039.00	25913.60	4344.617	6939.402					
5/17/02	2	159	13066.40	25935.40	4344.995	6944.316	957	20	7.80	6.71	31.45
			13060.10	25937.60	4345.633	6944.006					
5/17/02	2	206	12929.70	25839.10	4344.148	6920.373	1342	20	56.50	4.93	32.39
			12926.40	25843.70	4344.847	6920.624					
5/17/02	2	59	12908.20	25887.30	4350.700	6924.338	1537	20	32.05	5.13	32.14
			12912.80	25883.80	4350.026	6924.332					
5/17/02	2	55	12939.40	25902.40	4350.210	6929.068	1710	20	35.20	4.93	32.27
			12944.50	25898.80	4349.497	6929.101					
5/21/02	2	50	12855.00	25863.00	4351.632	6916.303	834	20	34.10	5.04	31.74
			12862.70	25863.20	4351.156	6917.027					
5/21/02	3	546	12836.80	25802.80	4346.280	6906.624	1308	16	47.15	5.06	32.52
			12833.30	25805.80	4346.836	6906.680					
5/21/02	3	317	12779.10	25851.70	4355.386	6907.528	1718	18	19.00	6.13	31.58
			12773.40	25850.80	4355.653	6906.835					
5/21/02	3	291	12774.30	25855.10	4356.076	6907.509	1830	15	20.50	6.17	31.54
			12770.00	25855.40	4356.382	6907.115					

Appendix A **Individual Station Descriptions**

DATE	REGION	GRID	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
5/22/02	3	102	12653.40	25898.00	4408.756	6901.962	730	20	25.00	5.42	31.34
			12646.00	25899.80	4409.368	6901.441					
5/22/02	3	56	12590.00	25896.10	4412.640	6855.538	910	20	21.00	5.76	31.39
			12582.10	25897.80	4413.327	6855.031					
5/22/02	3	14	12542.10	25910.20	4417.341	6853.085	1041	20	19.08	6.01	31.31
			12549.00	25908.20	4416.673	6853.437					
5/22/02	3	27	12512.30	25885.50	4416.500	6846.404	1232	20	15.00	5.92	31.19
			12518.80	25883.30	4415.828	6846.106					
5/22/02	3	4	12507.60	25912.00	4419.807	6850.054	1357	20	23.50	5.71	31.31
			12515.00	25911.30	4419.234	6850.664					
5/22/02	3	53	12602.10	25912.90	4413.730	6859.172	1703	16	28.10	5.60	31.38
			12595.80	25914.40	4414.303	6858.803					
5/23/02	3	399	12789.50	25825.70	4351.862	6904.998	742	20	33.30	5.30	32.17
			12783.70	25828.80	4352.578	6904.852					
5/23/02	3	447	12810.70	25822.90	4350.178	6906.717	1008	20	34.56	5.35	32.11
			12804.60	25825.90	4350.894	6906.532					
5/23/02	3	382	12683.50	25777.80	4353.322	6847.436	1342	20	47.40	5.83	32.13
			12690.50	25778.20	4352.925	6848.225					
5/24/02	3	364	12623.50	25754.80	4354.482	6837.496	744	18	51.55	5.76	32.90
			12628.40	25754.90	4354.182	6838.035					
5/25/02	3	359	12665.60	25775.20	4354.166	6845.147	758	20	48.80	5.80	32.23
			12660.40	25779.30	4354.947	6845.222					
5/25/02	3	333	12663.80	25782.90	4355.087	6846.226	1014	19	54.00	5.74	32.23
			12657.70	25782.20	4355.458	6845.375					
5/25/02	3	259	12621.20	25790.90	4358.764	6842.854	1151	15	43.45	5.70	32.35
			12621.00	25787.90	4358.452	6842.465					
5/25/02	3	121	12563.90	25845.50	4408.616	6845.356	1402	20	30.65	6.88	31.29
			12568.20	25841.60	4407.922	6845.195					
5/25/02	3	86	12539.50	25854.10	4411.177	6844.235	1542	18	11.50	7.01	31.02
			12543.10	25851.70	4410.668	6844.220					
5/27/02	4	492	12553.00	25772.10	4400.932	6832.607	715	20	40.75	5.94	32.21
			12560.00	25772.00	4400.472	6833.342					
5/27/02	4	309	12486.70	25792.30	4407.466	6828.770	1026	14	11.50	7.14	31.81
			12485.60	25794.90	4407.836	6829.088					
5/27/02	4	250	12490.80	25811.90	4409.479	6832.454	1133	15	16.15	7.53	31.69
			12486.30	25811.10	4409.678	6831.868					
5/28/02	4	580	12605.00	25751.60	4355.256	6834.963	727	20	48.80	5.79	32.43
			12604.50	25756.10	4355.815	6835.630					
5/28/02	4	543	12522.20	25730.90	4358.047	6822.350	1022	20	55.70	6.42	32.80
			12530.20	25730.90	4357.544	6823.252					
5/28/02	4	495	12535.60	25755.10	4400.056	6827.940	1221	20	46.45	6.22	32.47
			12539.20	25759.40	4400.340	6829.064					
5/28/02	4	456	12470.90	25743.00	4402.696	6818.574	1435	20	47.50	6.32	32.51
			12478.50	25743.00	4402.214	6819.442					
5/29/02	4	31	12379.80	25860.20	4422.199	6828.961	1025	20	15.30	7.36	30.83
			12376.40	25864.80	4422.962	6829.406					
5/29/02	4	42	12390.50	25852.50	4420.604	6829.406	1126	20	23.10	7.48	31.42
			12384.70	25856.40	4421.433	6828.808					

Appendix A Individual Station Descriptions

DATE	REGION	GRID	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
5/29/02	4	175	12437.70	25808.10	4412.434	6826.162	1324	20	16.15	7.72	31.65
			12431.40	25808.00	4412.833	6825.474					
5/29/02	4	286	12415.80	25760.10	4408.212	6815.328	1548	16	27.65	6.71	32.03
			12415.70	25762.90	4408.530	6815.805					
5/30/02	4	510	12425.70	25700.00	4400.377	6805.468	802	20	61.50	6.47	32.58
			12431.10	25698.90	4359.904	6805.912					
5/30/02	4	383	12393.60	25725.00	4405.407	6806.314	957	20	53.55	6.42	32.58
			12387.00	25725.10	4405.830	6805.518					
5/30/02	4	214	12337.00	25741.40	4410.967	6802.663	1318	20	46.30	6.88	32.10
			12329.70	25741.50	4411.456	6801.810					
5/31/02	4	165	12333.00	25754.70	4412.766	6804.862	723	20	41.15	6.57	32.37
			12330.20	25751.10	4412.568	6803.730					
5/31/02	4	94	12315.90	25781.60	4417.121	6807.874	959	21	33.00	6.32	32.06
			12309.00	25785.40	4418.030	6807.816					
5/31/02	4	28	12268.20	25805.80	4423.074	6807.060	1148	19	18.15	7.66	31.84
			12262.10	25808.00	4423.738	6806.801					
5/31/02	4	7	12268.30	25830.10	4425.945	6811.700	1311	20	24.05	6.69	31.84
			12261.20	25830.30	4426.407	6810.946					
6/3/02	5	427	12212.30	25779.90	4423.647	6755.498	904	10	17.87	7.03	32.07
			12214.50	25779.90	4423.507	6755.782					
6/3/02	5	510	12223.30	25752.20	4419.334	6751.423	1114	20	31.25	6.61	32.24
			12228.40	25749.10	4418.905	6751.108					
6/3/02	5	620	12249.20	25721.20	4414.152	6747.858	1341	20	48.35	6.61	32.71
			12241.00	25721.20	4414.615	6746.947					
6/3/02	5	566	12186.60	25720.40	4418.098	6739.700	1540	20	47.20	6.62	32.72
			12192.50	25721.50	4417.859	6740.691					
6/4/02	5	264	12131.00	25769.30	4427.694	6743.455	716	20	21.10	6.72	32.12
			12136.30	25765.10	4427.000	6743.356					
6/4/02	5	297	12116.30	25758.10	4427.500	6739.011	927	15	19.07	6.94	32.11
			12121.20	25757.10	4426.923	6739.466					
6/4/02	5	398	12159.40	25755.10	4424.139	6743.794	1100	20	26.70	6.81	32.14
			12165.70	25752.30	4423.380	6743.992					
6/4/02	5	437	12160.80	25740.30	4422.247	6740.732	1251	20	30.85	6.80	32.17
			12153.90	25741.90	4422.897	6740.210					
6/4/02	5	301	12097.00	25737.50	4426.144	6731.816	1500	20	44.55	6.65	32.31
			12090.60	25739.30	4426.808	6731.398					
6/5/02	5	118	11976.70	25744.50	4435.258	6717.200	736	20	31.00	6.77	32.11
			11981.70	25745.60	4435.038	6718.191					
6/5/02	5	180	12005.20	25740.20	4432.746	6720.095	947	18	33.87	6.64	32.21
			12008.40	25737.00	4432.132	6719.734					
6/6/02	5	37	11879.60	25742.30	4441.989	6702.583	807	20	44.83	6.62	32.01
			11873.80	25742.90	4442.484	6701.862					
6/6/02	5	19	11837.90	25742.00	4445.067	6656.072	1103	20	52.73	6.43	32.04
			11847.00	25738.80	4444.027	6656.588					
6/6/02	5	41	11860.00	25734.40	4442.489	6657.305	1216	20	53.83	6.41	32.04
			11868.10	25731.80	4441.581	6657.818					
6/6/02	5	39	11864.10	25738.20	4442.650	6659.046	1359	18	43.15	6.46	32.03
			11869.60	25737.30	4442.105	6659.650					

Appendix A **Individual Station Descriptions**

DATE	REGION	GRID	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
6/6/02	5	92	11924.10	25730.30	4437.287	6705.891	1541	16	45.43	6.55	32.02
			11918.30	25730.70	4437.757	6705.132					
6/7/02	5	220	12037.90	25736.90	4430.084	6723.766	741	20	38.15	6.71	32.20
			12031.30	25737.70	4430.638	6723.048					
6/7/02	5	350	12015.80	25687.70	4425.508	6708.021	1119	20	55.47	6.96	32.79
			12019.70	25689.50	4425.466	6709.084					
6/7/02	5	351	12018.60	25689.50	4425.540	6708.935	1238	18	58.75	6.97	32.82
			12024.50	25689.20	4425.082	6709.716					

Appendix A

Individual Station Descriptions

DATE	Trans.	Strat.	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
July 2001											
7/23/01	Z	1	13757.00	25964.50	4255.803	7045.117	703	20	14	8.54	31.90
			13750.30	25964.90	4256.349	7044.650					
7/23/01	Z	2	13722.40	25943.60	4256.719	7040.716	831	20	22.35	5.38	32.05
			13714.70	25943.10	4257.298	7040.059					
7/23/01	Z	3	13579.30	25898.30	4304.009	7025.079	1104	20	49.5	4.49	32.28
			13587.10	25892.70	4302.903	7025.244					
7/23/01	Z	4	13559.00	25873.10	4303.241	7021.176	1309	20	64.1	4.27	32.53
			13567.10	25874.90	4302.798	7022.016					
7/23/01	Z	5	13529.70	25864.20	4304.634	7017.874	1509	20	78	6.18	33.36
			13528.30	25870.70	4305.353	7018.306					
7/24/01	Y	1	13391.00	26007.80	4328.828	7019.264	1828	20	14.85	7.90	32.18
			13390.90	26013.90	4329.439	7019.826					
7/24/01	Y	2	13401.90	25980.90	4324.990	7017.896	1912	20	32.75	6.32	32.68
			13397.80	25980.90	4325.722	7017.282					
7/24/01	Y	3	13389.20	25963.70	4324.685	7014.920	644	20	42.8	4.71	32.40
			13395.80	25967.80	4324.580	7015.864					
7/24/01	Y	4	13254.20	25932.60	4331.484	7000.392	942	20	55.5	4.86	32.35
			13262.70	25934.70	4331.088	7001.323					
7/24/01	Y	5	13258.80	25880.30	4325.962	6955.472	1206	20	81.85	5.68	32.04
			13267.60	25879.60	4325.260	6956.181					
7/25/01	X	1	13129.50	25919.80	4339.029	6948.165	723	20	19		
			13121.90	25920.10	4339.570	6947.497					
7/25/01	X	2	13028.60	25916.50	4345.619	6938.798	930	20	33.2		
			13034.30	25912.80	4344.851	6938.888					
7/25/01	X	3	12956.40	25892.70	4348.048	6929.048	1231	20	43.9	5.42	32.07
			12951.40	25896.50	4348.804	6929.460					
7/25/01	X	4	13141.70	25890.60	4335.190	6946.043	1530	16	54.1	4.84	32.34
			13140.60	25895.00	4335.709	6946.436					
7/25/01	X	5	12975.30	25883.50	4345.799	6930.078	1712	18	63.65	4.10	32.37
			12980.80	25880.60	4345.136	6930.242					
7/26/01	W	1	12777.50	25854.30	4355.763	6907.770	650	20	18.75	8.79	31.86
			12770.30	25855.20	4356.344	6907.148					
7/26/01	W	2	12561.40	25844.30	4408.625	6844.908	1017	20	31.25	8.02	32.28
			12566.20	25840.20	4407.863	6844.781					
7/26/01	W	3	12658.70	25779.30	4355.072	6845.034	1312	20	48.3	10.7	31.60
			12667.90	25779.10	4354.434	6846.005					
7/29/01	W	4	12711.70	25731.50	4346.290	6843.523	618	20	59	7.80	32.93
			12717.50	25729.20	4345.670	6843.828					
7/29/01	W	5	12687.00	25719.10	4346.410	6838.943	750	20	69.6	7.59	33.26
			12679.30	25718.90	4346.873	6838.082					
7/27/01	V	1	12269.90	25805.00	4422.913	6807.120	959	16	18.5		
			12264.60	25806.80	4423.449	6806.876					
7/27/01	V	2	12314.80	25781.10	4417.146	6807.681	1255	20	34.6	8.51	32.13
			12321.40	25777.30	4416.298	6807.720					
7/27/01	V	3	12329.40	25757.20	4413.344	6805.799	1518	20	41.3	8.41	32.17

Appendix A **Individual Station Descriptions**

DATE	Trans.	Strat.	LORAN W	LORAN X	LAT deg/min	LON deg/min	Start Time	Tow Duration	Average Depth (FA)	Temp C °	Salinity ppt
Due to technical malfunction or equipment failure, some temperature and salinity records are incomplete.											
			12329.90	25752.80	4412.814	6804.043					
7/27/01	V	4	12407.90	25708.20	4402.478	6804.851	1707	20	55.45	4.79	32.26
			12405.80	25712.20	4403.095	6805.385					
7/27/01	V	5	12389.90	25696.80	4402.138	6800.369	1842	19	73		
			12390.80	25692.90	4401.670	6759.822					
7/28/01	U	1	12147.50	25778.10	4427.712	6747.337	627	20	19	9.18	31.94
			12149.10	25774.30	4427.130	6746.695					
7/28/01	U	2	12123.30	25737.50	4424.389	6735.298	912	20	31.9		
			12117.40	25737.30	4424.757	6734.468					
7/28/01	U	3	12191.00	25724.80	4418.389	6741.256	1111	20	45.5		
			12193.10	25720.30	4417.682	6740.522					
7/28/01	U	4	12156.00	25699.90	4417.571	6730.993	1403	20	81.85		
			12149.40	25699.80	4418.000	6730.081					
7/28/01	U	5	12088.30	25686.30	4420.371	6718.282	1637	20	79.75	7.53	33.92
			12082.60	25685.00	4420.599	6717.120					

Appendix B Taxa List

Finfish species

Flatfish

Atlantic halibut	<i>Hippoglossus hippoglossus</i>
Greenland halibut	<i>Reinhardtius hippoglossoides</i>
American plaice	<i>Hippoglossoides platessoides</i>
Summer flounder	<i>Paralichthys dentatus</i>
Four-spot flounder	<i>Paralichthys oblongus</i>
Yellowtail flounder	<i>Limanda ferruginea</i>
Winter flounder	<i>Pseudopleuronectes americanus</i>
Witch flounder	<i>Glyptocephalus cynoglossus</i>
Windowpane	<i>Scophthalmus aquosus</i>
Gulf Stream flounder	<i>Citharichthys arctifrons</i>

Gadids

Atlantic cod	<i>Gadus morhua</i>
Haddock	<i>Melanogrammus aeglefinus</i>
Pollock	<i>Pollachius virens</i>
Silver hake	<i>Merluccius bilinearis</i>
White hake	<i>Urophycis tenuis</i>
Red hake	<i>Urophycis chuss</i>
Spotted hake	<i>Urophycis regia</i>
Four-beard rockling	<i>Enchelyopus cimbrius</i>

Other Benthics

Acadian redfish	<i>Sebastes fasciatus</i>
Ocean pout	<i>Macrozoarces americanus</i>
Goosefish	<i>Lophius americanus</i>
Spiny Dogfish	<i>Squalus acanthias</i>
Atlantic hagfish	<i>Mxyine glutinosa</i>
Sea raven	<i>Hemitripterus americanus</i>
Alligatorfish	<i>Aspidophoroides monopterygius</i>
Lumpfish	<i>Cyclopterus lumpus</i>
Atlantic torpedo	<i>Torpedo nobiliana</i>
Winter skate	<i>Raja ocellata</i>
Little skate	<i>Raja erinacea</i>
Smooth skate	<i>Raja senta</i>
Thorny skate	<i>Raja radiata</i>
Longhorn sculpin	<i>Myoxocephalus octodecemspinosus</i>
Shorthorn sculpin	<i>Myoxocephalus scorpius</i>
Moustache sculpin	<i>Triglops murrayi</i>
Northern searobin	<i>Prionotus carolinus</i>
Snakeblenny	<i>Lumpenus lumpretaeformis</i>
Daubed shanny	<i>Lumpenus maculatus</i>
American sand lance	<i>Ammodytes americanus</i>
Atlantic silverside	<i>Menidia menidia</i>
Three-spine stickleback	<i>Gasterosteus aculeatus</i>

Appendix B Taxa List

Black sea bass	<i>Centropristis striata</i>
Atlantic tomcod	<i>Microgadus tomcod</i>
Cunner	<i>Tautoglabrus adspersus</i>
Grubby	<i>Myoxocephalus aeneus</i>
Striped seasnail	<i>Liparis liparis</i>
Seasnail	<i>Liparis atlanticus</i>
Gelatinous seasnail	<i>Liparis fabricii</i>
Radiated shanny	<i>Ulvaria subbifurcata</i>
Wolf eelpout	<i>Lycenchelys verrillii</i>
Pearlsides	<i>Maurollicus muelleri</i>
Wrymouth	<i>Cryptacanthodes maculatus</i>
Sturgeon	<i>Acipenser spp.</i>

Pelagics

Atlantic herring	<i>Clupea harengus</i>
Alewife	<i>Alosa pseudoharengus</i>
Blueback herring	<i>Alosa aestivalis</i>
American shad	<i>Alosa sapidissima</i>
Atlantic menhaden	<i>Brevoortia tyrannus</i>
Rainbow smelt	<i>Osmerus mordax</i>
Buckler dory	<i>Zenopsis conchifera</i>
Atlantic mackerel	<i>Scomber scombrus</i>
Butterfish	<i>Peprilus triacanthus</i>
Scup	<i>Stenotomas chrysops</i>
Rough scad	<i>Trachurus lathami</i>
Round scad	<i>Decapterus punctatus</i>
Silver anchovy	<i>Engraulis eurystole</i>
Barracudina sp.	<i>Paralepididae spp.</i>

Invertebrates

Crustaceans

American Lobster	<i>Homarus americanus</i>
Jonah Crab	<i>Cancer borealis</i>
Rock Crab	<i>Cancer irroratus</i>
Spider Crab unclass.	<i>Majidae spp.</i>
Northern Stone Crab	<i>Lithodes sp.</i>
Snow Crab	<i>Chionectes opilio</i>
Green Crab	<i>Carcinus maenas</i>
Sevenspine Bay Shrimp	<i>Crangon septemspinosa</i>
Spiny Lebbeid	<i>Lebbeus groenlandicus</i>
Bristled Longbeak	<i>Dichelopandalus leptocerus</i>
Aesop Shrimp	<i>Pandalus montagui</i>
Northern Shrimp	<i>Pandalus borealis</i>
Mantis Shrimp	<i>Stomatopod sp.</i>
Hermit Crab (unclass.)	<i>Diogenidae/Paguridae spp</i>
Krill	<i>Euphausid spp.</i>

Appendix B

Taxa List

Molluscs

Blue Mussel	<i>Mytilus edulis</i>
Sea Scallop	<i>Placopecten magellanicus</i>
Iceland Scallop	<i>Chlamys islandica</i>
Horse Mussel	<i>Modiolus modiolus</i>
Ocean Quahog	<i>Arctica islandica</i>
False Quahog	<i>Pitar morrhuana</i>
Northern Cardita	<i>Venercardia borealis</i>
Ax Head Clam	<i>Yoldia thraciaeformis</i>
Waved Astarte	<i>Astarte undata</i>
Squid (unclass.)	<i>Rossia spp.</i>
Shortfin Squid	<i>Illex illecebrosus</i>
Longfin Squid	<i>Loligo pealei</i>
Octopus (unclass.)	<i>Cephalopoda spp.</i>
Ten-Ridged Whelk	<i>Neptunea decemcostata</i>
Stimpson's Whelk	<i>Colus stimpsoni</i>

Others

Sand Dollar	<i>Echinoidae sp.</i>
Sea Urchin	<i>Stronglyocentrotus droebachiensis</i>
Starfish (unclass.)	various species
Boreal Asterias	<i>Asterias vulgaris</i>
Sea sponges	various species
Rat-tail Cucumber	<i>Caudina arenata</i>
Sea Cucumber	<i>Cucumaria frondosa</i>
Anemone	various species
Barnacle	various species

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Region 1						
Stratum 1						
Spiny Dogfish	15.344	5.752	6.400	2.015	81.281	1.048
Winter Skate	0.440	0.330	1.000	0.775	41.200	0.860
Little Skate	8.492	1.057	12.600	3.043	45.016	1.627
Atlantic Herring	0.108	0.061	4.000	2.025	14.050	1.426
Alewife	0.432	0.393	4.000	3.507	20.700	1.605
Silver Hake	28.660	20.494	374.400	240.182	22.357	2.753
Atlantic Cod	0.006	0.004	0.600	0.400	12.000	0.577
Haddock	0.158	0.061	7.000	4.087	12.914	1.017
Pollock	0.010	0.010	0.200	0.200	15.000	
White Hake	0.858	0.674	6.600	5.183	23.242	1.157
Red Hake	2.160	1.245	47.200	25.759	18.686	1.189
American Plaice	0.020	0.020	0.200	0.200	26.000	
Fourspot Flounder	0.316	0.148	2.000	0.894	27.600	1.718
Yellowtail Flounder	2.380	1.570	9.800	6.711	30.510	1.233
Winter Flounder	8.966	0.555	113.000	31.694	17.002	1.288
Witch Flounder	0.140	0.140	0.400	0.400	37.500	1.500
Windowpane	0.036	0.025	0.400	0.245	21.500	3.500
Atlantic Mackerel	0.300	0.300	0.400	0.400	19.500	0.500
Butterfish	3.280	1.927	57.400	31.035	13.718	1.342
Longhorn Sculpin	3.792	1.020	26.600	6.524	23.617	0.727
Sea Raven	0.294	0.254	0.800	0.583	24.250	5.949
Alligatorfish	0.004	0.004	0.200	0.200	13.000	
Cunner	0.020	0.020	0.200	0.200	19.000	
Ocean Pout	0.240	0.160	0.600	0.400	45.667	2.906
Goosefish	4.286	1.193	13.800	5.809	24.507	1.649
Bristled Longbeak	0.010	0.010	0.800	0.800		
Jonah Crab	5.086	1.556	27.800	5.886	10.777	0.608
Rock Crab	1.120	0.827	1.800	1.562	9.556	0.779
Sea Scallop	1.892	1.474	51.400	43.772	6.268	2.123
Longfin Squid	0.912	0.634	19.800	13.257	9.283	0.982
Sea sponges	0.030	0.030	0.400	0.400		
					CL (mm) (+/- mm)	
American Lobster	42.170	10.929	180.000	43.611	59.730	0.455
Region 1						
Stratum 2						
Spiny Dogfish	15.940	9.763	8.200	4.934	74.073	2.814
Little Skate	2.030	1.179	2.800	1.715	47.000	1.651
Atlantic Herring	318.890	293.146	2376.600	1933.416	23.217	8.498
Alewife	0.100	0.100	1.000	1.000	19.000	0.577
Silver Hake	36.276	13.463	455.400	163.375	22.584	2.001
Atlantic Cod	0.082	0.068	0.800	0.374	18.750	5.808
Haddock	0.004	0.004	0.400	0.400	10.500	0.500
Pollock	0.032	0.032	0.200	0.200	24.000	
White Hake	1.780	1.092	15.600	7.922	24.829	1.087

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Red Hake	9.764	3.162	77.000	18.352	25.984	1.257
Fourbeard Rockling	0.054	0.030	1.000	0.548	22.200	1.393
Atlantic Halibut	0.008	0.008	0.200	0.200	14.000	
American Plaice	2.600	0.975	30.600	12.319	21.464	0.904
Fourspot Flounder	0.648	0.211	2.800	1.068	30.214	0.923
Yellowtail Flounder	1.510	0.556	5.600	2.159	31.607	0.789
Winter Flounder	3.628	0.853	32.000	16.909	19.214	1.449
Witch Flounder	0.530	0.287	2.800	1.530	33.786	1.602
Atlantic Mackerel	0.030	0.030	0.400	0.400	19.500	0.500
Butterfish	1.634	1.027	33.400	26.216	13.540	0.960
Acadian Redfish	0.008	0.008	0.200	0.200	12.000	
Longhorn Sculpin	3.784	1.431	38.400	16.940	20.786	1.158
Sea Raven	0.072	0.057	0.800	0.374	15.000	2.739
Alligatorfish	0.026	0.026	1.800	1.562	13.000	0.577
Cunner	0.040	0.040	0.200	0.200	21.000	
Wrymouth	0.006	0.006	0.200	0.200	20.000	
Ocean Pout	0.440	0.271	1.600	1.030	39.875	1.674
Goosefish	12.370	3.427	42.200	13.354	23.880	1.201
Round Scad	0.010	0.006	0.400	0.245	11.000	2.000
Bristled Longbeak	0.070	0.037	23.200	10.906		
Jonah Crab	3.922	0.889	20.400	5.105		
Rock Crab	0.526	0.413	4.800	4.317	10.857	0.585
Mantis Shrimp	0.002	0.002	0.200	0.200	9.000	1.014
Sea Scallop	0.138	0.086	2.400	1.364	6.636	1.698
Shortfin Squid	0.560	0.169	6.200	2.596	15.806	0.969
Longfin Squid	0.098	0.057	9.000	5.779	5.846	1.016
Octopus (unclass.)	0.020	0.013	0.400	0.245	11.000	1.000
					CL (mm) (+/- mm)	
American Lobster	33.332	11.988	163.000	63.709	62.321	0.469
Region 1						
Stratum 3						
Spiny Dogfish	88.156	34.555	88.125	31.851	58.597	3.750
Atlantic Torpedo	1.981	1.981	0.125	0.125	96.000	
Winter Skate	0.706	0.706	0.125	0.125	85.000	
Smooth Skate	0.456	0.251	1.125	0.549	44.222	2.051
Thorny Skate	3.000	1.701	1.625	0.981	51.154	5.172
Atlantic Herring	11.925	5.842	94.625	53.599	23.376	1.108
Alewife	22.394	7.187	157.875	44.656	22.852	1.059
American Shad	0.205	0.103	1.750	0.861	21.500	0.679
Silver Hake	130.519	22.969	1678.750	270.262	21.951	3.283
Atlantic Cod	0.600	0.315	2.375	0.625	18.105	4.225
Haddock	0.918	0.646	1.250	0.977	38.900	3.522
Pollock	0.069	0.037	0.375	0.183	26.333	1.856
White Hake	11.831	3.635	14.000	2.915	44.946	1.331
Red Hake	27.581	3.323	157.500	31.155	29.548	1.081
Fourbeard Rockling	0.324	0.116	5.875	2.057	20.447	0.571

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
American Plaice	17.219	1.375	219.000	22.134	21.116	1.158
Fourspot Flounder	0.131	0.087	0.500	0.327	31.000	1.000
Yellowtail Flounder	0.556	0.104	2.000	0.378	31.813	0.586
Winter Flounder	1.100	0.877	2.250	1.698	33.444	1.830
Witch Flounder	22.175	7.013	172.000	55.938	27.146	1.296
Butterfish	0.775	0.408	10.250	4.970	15.902	0.704
Acadian Redfish	4.858	3.720	54.875	29.196	16.882	1.972
Longhorn Sculpin	0.700	0.521	4.625	3.674	24.595	0.950
Sea Raven	0.714	0.500	1.250	0.861	28.400	3.208
Alligatorfish	0.006	0.004	0.500	0.327	11.750	1.031
Lumpfish	0.350	0.350	0.250	0.250	27.000	1.000
Wrymouth	0.563	0.360	0.625	0.375	62.000	11.593
Ocean Pout	0.325	0.134	1.250	0.701	34.400	3.769
Goosefish	26.313	1.793	53.625	4.350	26.795	1.029
Pearlsides	0.003	0.003	0.625	0.625	4.800	0.632
Bristled Longbeak	0.221	0.101	59.375	32.667		
Aesop Shrimp	0.013	0.013	2.500	2.500		
Northern Shrimp	1.019	0.901	157.500	143.392		
Jonah Crab	3.250	0.803	24.625	5.916	9.269	0.495
Snow Crab	0.016	0.011	0.250	0.164	5.500	0.500
Starfish (unclass.)	0.199	0.117	1.125	0.479		
Sea Scallop	0.028	0.025	1.375	1.017	6.636	0.844
Northern Cardita	0.006	0.006	0.875	0.875	3.000	
Shortfin Squid	0.495	0.155	4.500	1.309	16.250	0.861
Octopus (unclass.)	0.095	0.033	2.375	0.822	10.000	0.585
Anemone	0.944	0.443	2.875	1.797		
					CL (mm) (+/- mm)	
American Lobster	3.675	1.844	12.000	6.503	74.302	1.308
Region 2						
Stratum 1						
Winter Skate	0.267	0.267	0.167	0.167	57.000	
Little Skate	0.757	0.226	1.667	0.333	37.100	4.062
Atlantic Herring	0.057	0.019	1.333	0.615	16.000	2.517
Alewife	23.935	23.307	649.000	636.250	14.746	6.839
Rainbow Smelt	1.875	1.875	74.167	74.167	14.294	4.485
Silver Hake	0.983	0.389	23.500	10.089	17.759	0.980
Atlantic Cod	0.347	0.129	12.667	5.536	13.395	0.887
Haddock	0.608	0.316	29.667	13.610	12.494	0.666
White Hake	0.220	0.158	8.333	6.756	13.200	1.238
Red Hake	0.047	0.031	0.833	0.543	19.600	1.449
Atlantic Halibut	0.048	0.024	2.000	1.000	12.500	0.707
Yellowtail Flounder	0.328	0.149	1.667	0.667	28.400	2.123
Winter Flounder	3.817	0.980	81.000	26.835	15.062	0.960
Windowpane	0.057	0.029	0.667	0.333	18.250	0.629
Threespine Stickleback	0.008	0.008	1.667	1.667	5.300	0.827
Atlantic Mackerel	9.650	8.201	92.000	76.636	22.136	2.156

Appendix C Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Butterfish	0.998	0.874	23.333	19.249	11.393	1.137
Acadian Redfish	0.030	0.030	1.000	1.000	11.500	1.969
Longhorn Sculpin	0.742	0.236	4.500	0.671	22.704	1.103
Sea Raven	0.172	0.166	1.000	0.683	17.500	3.519
Cunner	0.030	0.030	0.667	0.667	13.000	2.041
Ocean Pout	0.017	0.017	0.167	0.167	30.000	
Goosefish	0.968	0.399	3.333	1.333	23.550	1.227
Round Scad	0.015	0.010	0.333	0.211	13.000	
Jonah Crab	1.683	0.609	9.500	3.274	10.298	0.511
Rock Crab	3.650	0.987	28.500	8.007	9.018	0.595
Sand Dollar	0.127	0.070	2.167	1.973		
Atlantic Sturgeon	23.850	23.850	2.500	2.500	119.667	4.447
Sea Scallop	0.107	0.099	13.833	12.650	3.614	0.847
Ocean Quahog	0.025	0.025	0.167	0.167		
Longfin Squid	1.930	0.830	87.667	27.523	7.300	1.141
Anemone	0.017	0.017	0.167	0.167		
					CL (mm) (+/- mm)	
American Lobster	99.683	23.329	389.500	147.442	66.907	0.456
Region 2						
Stratum 2						
Spiny Dogfish	1.500	0.634	0.600	0.245	84.000	0.577
Little Skate	1.750	0.588	2.200	0.860	48.182	1.504
Thorny Skate	0.030	0.030	0.400	0.400	18.000	1.000
Atlantic Herring	32.290	28.822	562.000	488.653	18.274	3.255
Alewife	10.040	4.794	235.600	116.528	15.419	1.441
Rainbow Smelt	0.050	0.050	2.600	2.600	14.385	1.044
Silver Hake	21.390	2.054	363.400	27.763	20.296	1.780
Atlantic Cod	0.020	0.012	1.000	0.632	12.200	0.970
Haddock	0.014	0.012	0.600	0.400	12.667	2.028
Pollock	0.010	0.010	0.200	0.200	17.000	
White Hake	1.540	0.457	20.600	6.266	21.146	0.711
Red Hake	1.230	0.141	19.200	4.934	20.594	0.825
Fourbeard Rockling	0.014	0.010	0.400	0.245	19.000	1.000
Greenland Halibut	0.012	0.012	0.200	0.200	21.000	
American Plaice	1.000	0.815	8.000	6.197	23.350	1.479
Fourspot Flounder	0.060	0.040	0.400	0.245	27.000	2.000
Yellowtail Flounder	0.060	0.060	0.200	0.200	35.000	
Winter Flounder	1.796	1.130	31.200	23.617	16.032	1.180
Witch Flounder	0.010	0.010	0.600	0.600	14.333	2.333
Windowpane	0.100	0.088	1.000	0.775	19.200	1.463
Gulf Stream Flounder	0.004	0.004	0.200	0.200	11.000	
Atlantic Mackerel	0.210	0.102	2.200	1.114	21.636	1.199
Butterfish	0.232	0.096	3.800	1.744	13.316	0.655
Acadian Redfish	0.446	0.426	12.000	9.803	12.350	2.221
Longhorn Sculpin	7.710	1.682	75.200	18.819	20.394	0.887
Sea Raven	0.004	0.004	0.200	0.200	10.000	

Appendix C Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Snakeblenny	0.010	0.010	0.200	0.200	26.000	
Wrymouth	0.050	0.050	1.000	1.000	28.000	2.273
Goosefish	5.750	1.903	20.600	7.698	23.699	1.169
Bristled Longbeak	0.326	0.136	49.400	32.540		
Aesop Shrimp	1.064	0.660	345.600	229.047		
Northern Shrimp	0.054	0.054	28.800	28.800		
Jonah Crab	7.650	3.704	45.600	22.241	10.846	0.856
Rock Crab	1.040	0.719	6.600	4.534	9.939	0.726
Sea Scallop	0.002	0.002	0.400	0.400	2.500	0.500
Shortfin Squid	0.140	0.051	1.000	0.316	17.000	1.414
Longfin Squid	0.502	0.363	18.200	12.339	7.231	0.780
					CL (mm) (+/- mm)	
American Lobster	75.640	18.847	373.000	102.692	60.254	0.362
Region 2						
Stratum 3						
Spiny Dogfish	13.900	5.292	8.143	3.105	69.404	3.017
Winter Skate	0.657	0.657	0.143	0.143	82.000	
Little Skate	4.114	2.420	6.571	4.342	44.478	1.525
Thorny Skate	0.243	0.243	0.143	0.143	55.000	
Atlantic Herring	1.086	0.267	14.714	3.784	19.631	0.575
Alewife	6.857	3.601	83.857	33.875	18.945	1.245
American Shad	0.289	0.229	1.857	1.534	23.462	0.825
Rainbow Smelt	0.003	0.002	0.286	0.184	6.500	0.500
Silver Hake	131.279	29.062	1810.286	398.028	21.968	3.380
Atlantic Cod	0.043	0.021	2.000	0.926	13.714	0.458
Pollock	0.021	0.015	0.429	0.297	15.333	0.577
White Hake	3.821	0.391	29.000	4.408	25.453	0.732
Red Hake	12.421	4.583	74.000	19.657	28.749	0.936
Fourbeard Rockling	0.337	0.108	7.429	2.298	21.288	0.767
Greenland Halibut	0.007	0.007	0.143	0.143	8.000	
American Plaice	5.257	1.463	60.429	14.645	21.478	0.869
Fourspot Flounder	0.064	0.045	0.286	0.184	30.000	3.000
Yellowtail Flounder	0.543	0.129	2.143	0.459	31.929	0.842
Winter Flounder	0.626	0.175	1.571	0.481	30.364	1.955
Witch Flounder	3.136	0.492	115.000	21.908	16.370	1.137
Windowpane	0.007	0.007	0.143	0.143	13.000	
Atlantic Mackerel	0.020	0.020	0.143	0.143	25.000	
Butterfish	0.323	0.135	4.286	1.924	15.033	0.964
Acadian Redfish	0.049	0.019	9.571	4.168	5.343	1.090
Longhorn Sculpin	2.507	0.814	11.571	3.993	26.185	0.627
Sea Raven	0.164	0.141	0.286	0.184	30.500	11.500
Alligatorfish	0.003	0.003	0.143	0.143	13.000	
Lumpfish	0.479	0.206	1.143	0.261	23.875	4.060
Snakeblenny	0.007	0.007	0.143	0.143	32.000	
Daubed Shanny	0.001	0.001	0.143	0.143	12.000	
Wrymouth	0.743	0.196	6.000	1.799	34.929	1.857

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Goosefish	24.600	5.997	48.571	10.339	27.776	1.109
Sevenspine Bay Shrimp	0.014	0.014	4.286	4.286		
Bristled Longbeak	1.956	0.942	666.714	350.862		
Aesop Shrimp	0.631	0.591	190.571	169.144		
Northern Shrimp	1.914	1.281	351.714	245.062		
Jonah Crab	6.143	1.018	44.286	8.334	9.526	0.612
Spider Crab (unclass.)	0.079	0.079	0.286	0.286	10.000	
Sea Scallop	3.257	1.918	52.429	34.949	7.597	1.007
Shortfin Squid	0.729	0.127	4.714	0.808	18.545	0.398
Longfin Squid	0.144	0.086	9.429	4.700	6.985	0.678
Octopus (unclass.)	0.021	0.021	0.143	0.143	12.000	
Anemone	0.364	0.249	0.714	0.421		
					CL (mm) (+/- mm)	
American Lobster	3.677	1.400	11.714	5.195	71.651	1.743
Region 3						
Stratum 1						
Atlantic Herring	39.613	15.948	3787.250	1472.470	10.206	9.706
Alewife	8.600	5.517	257.750	144.390	14.099	2.978
Rainbow Smelt	2.975	1.259	410.500	340.457	14.193	3.001
Silver Hake	0.770	0.710	16.000	14.674	17.828	1.553
Atlantic Cod	0.025	0.019	1.500	0.957	13.667	1.022
Haddock	0.178	0.168	6.750	6.088	14.259	1.011
Pollock	0.010	0.010	0.250	0.250	18.000	
White Hake	0.250	0.061	4.250	2.358	17.882	2.071
Red Hake	0.050	0.030	0.500	0.289	24.000	0.000
Winter Flounder	2.738	0.660	61.750	17.100	14.607	1.051
Windowpane	0.103	0.053	2.000	0.577	14.250	1.634
Atlantic Silverside	0.010	0.010	1.500	1.500	9.167	0.898
Atlantic Mackerel	2.990	2.720	21.000	18.005	23.774	1.126
Butterfish	0.030	0.030	0.750	0.750	11.667	0.882
Sea Raven	0.003	0.003	0.250	0.250	7.000	
Sevenspine Bay Shrimp	0.143	0.129	64.500	58.551		
Bristled Longbeak	0.013	0.013	4.500	4.500		
Aesop Shrimp	0.230	0.230	79.250	79.250		
Jonah Crab	0.275	0.189	1.000	0.707	12.000	0.913
Rock Crab	1.063	0.860	8.000	6.733	8.875	0.941
Starfish (unclass.)	0.030	0.024	0.500	0.500		
Longfin Squid	0.678	0.202	20.500	6.076	8.512	0.669
Toad Crab	0.010	0.006	0.500	0.289	2.500	0.500
					CL (mm) (+/- mm)	
American Lobster	64.238	51.428	286.750	239.700	65.318	0.422
Region 3						
Stratum 2						
Spiny Dogfish	0.027	0.027	0.333	0.333	27.000	
Atlantic Herring	6.600	3.625	1111.000	578.464	8.662	6.423
Alewife	11.500	4.262	325.333	107.412	14.512	2.861

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Rainbow Smelt	0.583	0.347	23.667	15.191	14.690	1.241
Silver Hake	5.310	4.659	94.667	86.225	19.852	2.141
Atlantic Cod	0.057	0.022	1.667	0.667	15.000	1.789
Haddock	0.100	0.100	2.000	2.000	16.333	1.394
White Hake	0.667	0.296	7.333	3.180	21.818	1.083
Red Hake	0.313	0.247	4.667	4.177	21.000	1.626
Atlantic Halibut	0.467	0.467	0.333	0.333	50.000	
American Plaice	0.007	0.007	0.333	0.333	13.000	
Winter Flounder	1.467	1.020	25.667	15.941	14.636	1.313
Witch Flounder	0.010	0.010	0.333	0.333	16.000	
Windowpane	0.387	0.207	10.333	7.839	13.387	1.196
Atlantic Silverside	0.003	0.003	0.667	0.667	9.000	
Atlantic Mackerel	1.233	0.649	6.667	3.383	25.700	0.727
Butterfish	0.140	0.087	4.000	3.512	11.167	1.192
Acadian Redfish	0.040	0.040	1.333	1.333	11.750	2.016
Longhorn Sculpin	1.967	1.967	24.667	24.667	18.892	1.873
Sea Raven	0.020	0.012	1.000	0.577	10.333	0.333
Alligatorfish	0.027	0.027	0.667	0.667	13.500	1.500
Ocean Pout	0.033	0.033	0.333	0.333	21.000	
Goosefish	0.300	0.300	0.667	0.667	29.000	2.000
Sevenspine Bay Shrimp	0.027	0.013	9.667	5.239		
Bristled Longbeak	0.457	0.234	164.667	84.708		
Aesop Shrimp	0.940	0.442	250.000	128.461		
Jonah Crab	0.600	0.458	3.000	2.082	10.333	0.756
Rock Crab	2.067	1.870	18.000	15.567	8.685	0.964
American Eel	0.067	0.067	0.333	0.333	53.000	
Shortfin Squid	0.067	0.067	0.333	0.333	20.000	
Longfin Squid	0.567	0.285	19.333	9.821	8.259	0.958
Toad Crab	0.007	0.007	0.333	0.333	3.000	
CL (mm) (+/- mm)						
American Lobster	42.733	23.620	103.000	75.941	73.702	1.238
Region 3						
Stratum 3						
Spiny Dogfish	10.193	4.962	7.125	3.335	72.643	2.139
Little Skate	0.750	0.334	1.125	0.398	48.000	0.926
Atlantic Herring	0.253	0.075	10.875	7.138	17.953	0.730
Alewife	1.928	0.861	27.250	12.730	18.117	0.720
Silver Hake	137.596	23.835	1700.125	240.779	22.637	4.031
Atlantic Cod	0.279	0.148	2.875	0.972	17.130	2.283
Haddock	0.016	0.013	0.375	0.263	18.000	2.082
Pollock	0.068	0.055	0.500	0.327	23.250	2.780
White Hake	5.131	2.027	34.000	15.443	26.224	1.363
Red Hake	7.804	4.150	57.750	25.780	27.606	0.902
Fourbeard Rockling	0.111	0.079	0.625	0.263	23.400	1.435
Greenland Halibut	0.003	0.003	0.125	0.125	8.000	
American Plaice	1.671	1.164	12.750	6.433	24.610	1.087

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Fourspot Flounder	0.104	0.093	0.500	0.327	25.000	5.817
Yellowtail Flounder	0.020	0.020	0.125	0.125	29.000	
Winter Flounder	0.838	0.452	4.875	2.793	23.282	0.991
Witch Flounder	1.375	0.811	26.250	8.252	19.181	1.432
Windowpane	0.140	0.060	2.750	1.191	17.091	0.730
Atlantic Mackerel	0.228	0.157	1.500	1.086	25.250	1.099
Butterfish	0.313	0.099	3.750	1.065	15.214	0.437
Acadian Redfish	1.043	0.899	12.000	9.595	15.438	1.939
Longhorn Sculpin	8.184	2.531	80.375	26.077	20.911	0.942
Sea Raven	0.188	0.114	1.125	0.581	15.222	4.325
Alligatorfish	0.003	0.003	0.125	0.125	10.000	
Lumpfish	0.219	0.219	0.500	0.500	19.667	3.844
Ocean Pout	0.044	0.032	0.250	0.164	32.000	4.000
Goosefish	3.643	1.144	5.875	1.381	31.600	1.118
Sevenspine Bay Shrimp	0.001	0.001	0.125	0.125		
Bristled Longbeak	0.939	0.358	482.875	231.241		
Aesop Shrimp	3.030	2.668	344.625	231.431		
Northern Shrimp	1.678	1.618	149.500	142.725		
Jonah Crab	2.938	1.043	16.250	5.199	10.295	0.561
Rock Crab	0.038	0.038	0.250	0.250	10.000	3.000
Spider Crab (unclass.)	0.075	0.075	0.250	0.250	10.000	1.000
Sea Scallop	5.805	1.893	103.875	31.737	7.325	0.817
Waved Astarte	0.010	0.010	0.375	0.375	2.667	0.577
Shortfin Squid	0.143	0.048	1.500	0.327	17.846	0.687
Longfin Squid	0.119	0.072	4.500	2.420	7.944	0.577
Octopus (unclass.)	0.023	0.012	0.500	0.267	10.000	1.871
Toad Crab	0.010	0.010	0.375	0.375	2.667	0.577
Anemone	1.138	1.123	0.125	0.125		
					CL (mm) (+/- mm)	
American Lobster	22.771	10.389	41.625	19.090	81.438	1.224
Region 4						
Stratum 1						
Thorny Skate	0.003	0.003	0.167	0.167	15.000	
Atlantic Herring	31.078	13.766	2653.500	1217.478	10.921	4.840
Alewife	5.950	1.947	304.000	130.295	12.127	1.913
Rainbow Smelt	7.945	1.893	397.833	110.497	14.035	1.412
Silver Hake	0.017	0.017	1.000	1.000	12.000	1.789
Atlantic Cod	0.135	0.081	5.833	3.544	13.200	0.831
Haddock	0.925	0.592	40.000	26.553	13.367	1.252
Pollock	0.013	0.013	0.333	0.333	15.500	0.500
White Hake	0.507	0.178	18.500	7.860	14.578	0.863
Atlantic Halibut	0.012	0.007	0.333	0.211	15.000	1.000
Winter Flounder	2.097	1.024	53.000	25.848	13.808	0.905
Windowpane	0.053	0.026	2.167	0.872	12.000	1.161
Atlantic Mackerel	4.687	3.628	33.833	25.484	24.463	0.977
Butterfish	0.493	0.266	19.000	10.386	10.956	0.623

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Shorthorn Sculpin	0.033	0.033	1.333	1.333	10.500	1.397
Longhorn Sculpin	0.022	0.016	1.500	1.310	8.667	1.265
Sea Raven	0.110	0.081	9.000	6.986	8.926	0.883
Alligatorfish	0.008	0.005	1.167	0.980	9.714	0.535
Lumpfish	0.003	0.003	0.167	0.167	7.000	
Cunner	0.033	0.033	0.333	0.333	18.500	4.500
Sevenspine Bay Shrimp	1.055	0.708	519.000	399.863		
Bristled Longbeak	0.010	0.010	1.333	1.333		
Aesop Shrimp	0.028	0.026	10.167	9.968		
Jonah Crab	0.973	0.907	5.000	4.612	9.767	1.356
Rock Crab	2.642	1.818	24.833	18.988	8.846	0.949
Sea Urchin	0.005	0.003	0.333	0.211		
Starfish (unclass.)	0.692	0.410	0.167	0.167		
Longfin Squid	0.897	0.519	29.000	16.472	8.451	0.820
Toad Crab	0.023	0.011	1.167	0.654	2.571	0.293
Sea Cucumber	21.925	21.229	62.667	60.877		
					CL (mm) (+/- mm)	
American Lobster	16.675	10.791	51.833	35.266	70.720	0.639
Region 4						
Stratum 2						
Little Skate	0.533	0.533	0.667	0.667	49.500	1.500
Atlantic Herring	16.650	8.923	629.667	377.673	13.326	7.171
Alewife	3.030	1.819	80.333	51.492	14.440	1.117
Rainbow Smelt	1.700	1.700	73.667	73.667	14.317	2.886
Silver Hake	9.877	5.678	168.333	86.070	19.513	3.111
Atlantic Cod	0.033	0.018	2.000	1.155	12.667	0.803
Haddock	0.057	0.003	2.000	0.000	16.167	0.264
Pollock	0.060	0.060	0.667	0.667	19.000	2.000
White Hake	1.667	0.384	24.333	6.741	19.438	1.077
Red Hake	0.130	0.072	1.333	0.667	23.500	0.645
Spotted Hake	0.033	0.033	0.333	0.333	23.000	
Winter Flounder	2.417	0.566	40.667	24.009	15.189	1.451
Windowpane	0.443	0.166	9.333	3.756	15.536	0.525
Atlantic Silverside	0.013	0.013	0.667	0.667	10.500	1.500
Atlantic Mackerel	0.560	0.386	3.667	2.728	25.273	0.778
Butterfish	0.243	0.012	8.000	0.577	11.417	0.602
Acadian Redfish	0.013	0.007	1.000	0.577	5.667	0.333
Shorthorn Sculpin	0.067	0.067	0.333	0.333	25.000	
Longhorn Sculpin	1.367	0.590	21.667	10.333	17.338	1.079
Sea Raven	0.020	0.012	0.667	0.333	11.500	0.500
Round Scad	0.013	0.013	0.333	0.333	13.000	
Sevenspine Bay Shrimp	0.710	0.695	281.667	279.167		
Bristled Longbeak	0.253	0.224	105.667	88.280		
Aesop Shrimp	0.527	0.301	169.333	60.023		
Jonah Crab	0.073	0.073	0.333	0.333	7.000	
Rock Crab	0.347	0.179	2.667	1.202	9.250	0.648

Appendix C Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Sea Scallop	0.667	0.667	5.000	5.000	9.133	1.572
Shortfin Squid	0.027	0.027	0.667	0.667	11.000	
Longfin Squid	0.057	0.043	1.667	1.202	7.600	0.447
Toad Crab	0.007	0.007	0.667	0.667	1.500	0.500
					CL (mm) (+/- mm)	
American Lobster	32.867	15.263	92.333	43.670	72.931	0.897
Region 4						
Stratum 3						
Spiny Dogfish	11.100	2.535	6.333	1.443	76.228	1.279
Winter Skate	0.422	0.422	0.111	0.111	76.000	
Little Skate	0.474	0.253	0.667	0.289	46.833	2.676
Smooth Skate	0.056	0.056	0.111	0.111	43.000	
Thorny Skate	0.010	0.010	0.111	0.111	14.000	
Atlantic Herring	0.519	0.259	6.889	3.426	19.661	0.816
Alewife	0.307	0.088	3.778	1.222	19.529	0.639
Silver Hake	161.733	39.337	2045.111	609.521	22.605	3.837
Atlantic Cod	0.101	0.037	3.000	0.972	14.074	0.634
Haddock	0.033	0.033	0.667	0.667	17.000	0.577
Pollock	0.473	0.179	0.778	0.222	32.143	6.205
White Hake	6.417	0.778	37.333	2.843	27.068	0.821
Red Hake	4.260	1.560	38.444	14.847	25.558	0.814
Fourbeard Rockling	0.040	0.016	1.111	0.484	19.100	1.637
Atlantic Halibut	0.622	0.622	0.111	0.111	79.000	
American Plaice	0.652	0.226	5.556	1.608	23.180	1.057
Fourspot Flounder	0.004	0.004	0.111	0.111	16.000	
Yellowtail Flounder	0.033	0.033	0.111	0.111	36.000	
Winter Flounder	0.820	0.317	4.667	1.878	20.690	1.726
Witch Flounder	2.817	0.937	74.222	17.526	17.398	1.013
Windowpane	0.040	0.030	1.222	0.846	16.455	0.853
Gulf Stream Flounder	0.004	0.003	0.222	0.147	13.000	0.000
Atlantic Mackerel	0.126	0.091	1.000	0.667	24.000	0.436
Butterfish	0.120	0.055	1.889	0.949	14.176	0.540
Acadian Redfish	0.044	0.015	5.222	1.234	6.085	0.955
Longhorn Sculpin	1.937	1.320	41.667	34.690	15.763	1.348
Sea Raven	0.219	0.193	1.222	0.703	15.727	4.253
Alligatorfish	0.002	0.002	0.111	0.111	12.000	
Lumpfish	0.004	0.004	0.111	0.111	13.000	
Snakeblenny	0.001	0.001	0.111	0.111	9.000	
Goosefish	4.358	1.317	5.111	1.006	32.043	1.727
Sevenspine Bay Shrimp	0.001	0.001	0.111	0.111		
Bristled Longbeak	1.377	0.516	379.667	151.559		
Aesop Shrimp	0.581	0.462	175.556	111.115		
Northern Shrimp	0.156	0.076	40.889	21.973		
Jonah Crab	0.818	0.436	4.889	2.348	10.568	0.558
Rock Crab	0.273	0.190	1.889	1.306	9.294	0.671
Horse Mussel	0.011	0.011	0.111	0.111		

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Sea Scallop	4.918	1.678	137.778	74.587	6.359	1.070
Shortfin Squid	0.029	0.016	0.444	0.176	13.250	2.394
Longfin Squid	0.068	0.049	1.222	0.662	9.727	1.191
Octopus (unclass.)	0.014	0.010	0.333	0.236	10.667	1.202
					CL (mm) (+/- mm)	
American Lobster	10.439	5.150	18.222	10.306	85.573	1.933
Region 5						
Stratum 3						
Spiny Dogfish	11.948	3.001	6.833	1.621	75.195	1.927
Little Skate	0.208	0.208	0.333	0.333	45.000	1.000
Smooth Skate	0.880	0.342	3.500	1.565	34.571	2.147
Thorny Skate	0.708	0.708	0.667	0.667	44.250	6.047
Atlantic Herring	0.443	0.246	14.167	11.188	13.765	1.441
Alewife	0.557	0.170	5.333	1.606	20.219	0.726
Silver Hake	88.042	48.935	1269.000	793.821	22.884	3.068
Atlantic Cod	0.477	0.268	7.667	3.739	11.870	2.814
Haddock	0.032	0.019	0.500	0.224	16.000	0.000
Pollock	0.142	0.100	0.500	0.342	38.667	1.667
White Hake	5.780	1.173	39.500	14.440	25.924	0.953
Red Hake	5.908	1.428	47.500	12.022	26.196	0.797
Fourbeard Rockling	0.272	0.126	4.667	2.692	22.000	0.781
American Plaice	0.608	0.139	5.833	1.138	22.971	1.102
Fourspot Flounder	0.250	0.178	1.000	0.632	30.333	1.229
Winter Flounder	2.687	0.884	12.167	3.070	25.479	0.918
Witch Flounder	4.498	1.965	59.000	14.154	21.093	1.714
Windowpane	0.208	0.208	2.167	2.167	19.846	1.342
Atlantic Mackerel	0.013	0.013	0.167	0.167	25.000	
Butterfish	0.423	0.366	4.500	3.713	16.630	0.766
Acadian Redfish	0.027	0.012	4.833	3.655	5.828	1.191
Longhorn Sculpin	1.820	1.145	21.833	15.961	19.687	1.274
Sea Raven	0.087	0.083	0.333	0.211	18.500	8.500
Alligatorfish	0.002	0.002	0.167	0.167	11.000	
Ocean Pout	0.125	0.125	0.833	0.833	34.000	1.304
Goosefish	2.763	0.445	5.000	0.730	29.767	2.109
Sevenspine Bay Shrimp	0.020	0.016	3.333	2.348		
Bristled Longbeak	0.432	0.172	127.167	48.629		
Aesop Shrimp	0.242	0.136	104.167	59.780		
Northern Shrimp	0.013	0.008	10.333	9.538		
Jonah Crab	4.347	1.253	21.500	4.794	10.705	0.568
Rock Crab	0.027	0.027	0.167	0.167	11.000	
Spider Crab (unclass.)	0.042	0.042	0.167	0.167	10.000	
Snow Crab	0.007	0.007	0.167	0.167	6.000	
Sea Urchin	0.002	0.002	0.167	0.167		
Starfish (unclass.)	0.967	0.947	7.167	6.775		
Sea Scallop	2.513	1.634	53.167	23.247	7.514	1.405
Ocean Quahog	0.057	0.049	2.667	2.290		

Appendix C

Survey Catch Summaries

Survey results Fall 2001

	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error
	Weight	(+/-)	Number	(+/-)	Length	(+/-)
	(kg.)	(kg.)			(cm)	(cm)
Shortfin Squid	0.042	0.042	0.333	0.333	18.000	1.000
Longfin Squid	0.048	0.041	0.333	0.211	13.000	6.000
Octopus (unclass.)	0.007	0.004	0.333	0.211	9.000	0.000
					CL (mm) (+/- mm)	
American Lobster	7.303	3.550	17.667	11.345	n/a	n/a

Appendix C Survey Catch Summaries

Survey Results July 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Stratum 1						
Spiny Dogfish	0.57	0.57	0.17	0.17	84.00	
Winter Skate	0.38	0.25	0.50	0.34	43.67	4.98
Little Skate	2.96	1.83	4.17	2.83	46.32	1.59
Atlantic Herring	6.70	5.51	325.00	204.96	12.21	6.68
Alewife	0.37	0.29	5.33	3.18	17.50	1.46
Silver Hake	10.65	6.21	226.17	132.35	18.51	1.87
Atlantic Cod	0.16	0.09	12.00	5.61	9.53	1.28
Haddock	0.08	0.02	11.50	4.96	8.13	0.47
White Hake	0.11	0.07	4.33	2.79	13.96	1.42
Red Hake	0.62	0.37	13.83	7.48	17.94	1.05
American Plaice	0.03	0.02	0.67	0.49	17.75	2.56
Fourspot Flounder	0.13	0.06	0.50	0.22	28.67	2.91
Yellowtail Flounder	0.73	0.48	2.50	1.63	32.40	0.71
Winter Flounder	6.04	2.91	69.33	23.88	17.73	1.23
Witch Flounder	0.00	0.00	0.33	0.21	12.00	1.00
Windowpane	0.14	0.10	3.67	2.46	13.18	0.74
Atlantic Mackerel	0.16	0.10	1.17	0.65	23.71	1.37
Butterfish	0.11	0.04	1.83	0.75	11.91	1.61
Acadian Redfish	0.02	0.02	0.33	0.21	13.50	0.50
Longhorn Sculpin	2.75	1.10	30.17	10.67	20.37	0.85
Sea Raven	0.25	0.19	0.50	0.34	25.67	3.84
Lumpfish	0.05	0.04	0.33	0.21	10.50	4.50
Ocean Pout	0.03	0.03	0.17	0.17	32.00	
Goosefish	1.63	0.27	6.50	1.12	23.74	1.08
Jonah Crab	0.01	0.01	0.17	0.17	6.00	
Rock Crab	0.59	0.16	4.83	1.35	8.86	0.45
Sand Dollar	0.25	0.25				
Boreal Asterias	0.08	0.08	0.83	0.83		
Blue Mussel	0.01	0.01	0.83	0.83	4.20	0.68
Sea Scallop	0.02	0.02	3.83	3.45	3.17	0.74
Shortfin Squid	0.01	0.01	0.33	0.21	10.50	1.50
American Sand Lance	0.03	0.03	0.67	0.67	23.00	0.58
Toad Crab	0.01	0.01	0.50	0.50	2.33	0.58
Sea Cucumber	0.43	0.43	0.50	0.50		
					CL (mm) (+/- mm)	
American Lobster	65.19	34.05	248.50	135.49	65.04	15.83
Strata 2						
Winter Skate	0.37	0.37	0.33	0.33	55.00	1.00
Little Skate	0.83	0.42	1.83	0.91	33.36	4.22
Thorny Skate	0.31	0.31	0.67	0.67	36.00	2.16
Atlantic Herring	23.64	14.34	228.67	124.14	21.22	3.07
Alewife	5.96	5.05	86.33	71.57	18.38	1.43
Blueback Herring	0.50	0.50	5.33	5.33	20.63	2.25
American Shad	0.02	0.01	0.33	0.21	16.50	0.50

Appendix C Survey Catch Summaries

Survey Results July 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Silver Hake	28.17	8.51	447.17	133.11	20.96	2.41
Atlantic Cod	0.03	0.01	5.50	2.59	7.48	0.55
Haddock	0.04	0.02	1.83	0.91	9.45	1.41
White Hake	1.05	0.61	30.67	25.56	15.56	1.75
Red Hake	34.73	32.71	168.17	147.98	31.38	2.08
American Plaice	1.68	1.21	17.83	12.56	22.20	1.16
Yellowtail Flounder	2.83	1.76	10.83	6.75	30.95	0.94
Winter Flounder	3.18	1.66	19.00	9.53	21.92	1.19
Witch Flounder	0.32	0.18	1.67	0.92	28.60	3.18
Windowpane	0.15	0.08	3.00	2.10	15.22	1.61
Butterfish	0.19	0.11	2.33	1.02	16.21	1.15
Acadian Redfish	0.00	0.00	0.00	0.00	24.87	1.81
Longhorn Sculpin	3.83	1.23	35.83	9.65	20.53	0.96
Sea Raven	0.53	0.38	1.00	0.63	27.50	3.75
Lumpfish	1.13	0.88	2.17	1.64	20.46	1.77
Snakeblenny	0.01	0.01	0.17	0.17	23.00	
Ocean Pout	0.15	0.11	1.00	0.52	29.33	3.88
Goosefish	4.77	2.31	11.83	4.81	24.87	1.80
Sevenspine Bay Shrimp	0.03	0.03	19.17	18.97		
Spiny Lebbeid	0.00	0.00	0.50	0.50		
Bristled Longbeak	1.81	1.68	43.33	24.17		
Aesop Shrimp	0.69	0.53	185.00	152.14		
Northern Shrimp	0.02	0.02	0.67	0.67		
Jonah Crab	0.46	0.35	1.17	0.83	13.43	1.23
Rock Crab	2.75	1.96	24.50	19.41	8.54	1.05
Starfish unclass.	0.23	0.23				
Boreal Asterias	0.54	0.40	5.50	3.98		
Sea Scallop	0.45	0.29	8.00	4.89	6.81	0.91
Waved Astarte	0.00	0.00	0.17	0.17	2.00	
Shortfin Squid	0.03	0.02	0.50	0.22	13.33	1.33
Longfin Squid	0.00	0.00	0.17	0.17	6.00	
Toad Crab	0.01	0.00	0.33	0.21	3.00	0.00
Sea Cucumber	0.36	0.36	0.67	0.67		
					CL (mm) (+/- mm)	
American Lobster	26.36	8.84	80.33	25.03	69.74	15.11
Strata 3						
Spiny Dogfish	1.17	0.76	1.00	0.68	56.33	8.98
Little Skate	0.08	0.08	0.17	0.17	39.00	
Smooth Skate	0.18	0.18	0.33	0.33	47.00	1.00
Atlantic Herring	11.08	3.94	108.00	33.44	21.33	1.94
Alewife	2.13	0.94	26.83	11.03	18.99	0.76
Blueback Herring	0.21	0.18	1.50	1.31	23.11	1.08
American Shad	0.08	0.05	0.50	0.22	22.33	2.85
Silver Hake	90.18	27.84	1122.67	380.54	22.55	2.66
Atlantic Cod	2.05	1.89	14.67	9.50	11.22	4.14

Appendix C

Survey Catch Summaries

Survey Results July 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Haddock	0.01	0.01	0.67	0.67	7.75	0.61
Pollock	0.30	0.24	0.67	0.33	30.00	7.37
White Hake	1.83	1.08	6.67	2.35	30.53	1.78
Red Hake	17.68	9.51	83.00	39.20	30.80	1.41
Fourbeard Rockling	0.00	0.00	0.17	0.17	24.00	
American Plaice	11.98	6.23	97.67	46.95	23.29	1.59
Fourspot Flounder	0.13	0.07	0.50	0.22	29.33	3.84
Yellowtail Flounder	0.93	0.48	3.67	1.91	30.50	0.86
Winter Flounder	1.02	0.44	5.50	2.14	22.58	1.30
Witch Flounder	1.63	0.99	21.50	5.27	19.50	1.91
Windowpane	0.02	0.02	0.67	0.67	14.50	1.22
Butterfish	0.07	0.07	0.67	0.67	16.50	0.71
Acadian Redfish	0.13	0.07	3.17	2.26	12.58	1.07
Longhorn Sculpin	2.99	1.73	23.17	12.22	23.41	1.11
Sea Raven	0.81	0.43	0.83	0.31	34.00	5.76
Alligatorfish	0.01	0.01	0.67	0.49	10.00	1.08
Lumpfish	2.93	2.57	3.50	2.91	23.38	1.08
Atlantic Wolffish	0.53	0.53	0.17	0.17	67.00	
Ocean Pout	0.10	0.08	0.33	0.21	32.50	10.50
Goosefish	6.53	0.89	17.50	4.75	23.79	1.34
Sevenspine Bay Shrimp	0.00	0.00	0.17	0.17		
Bristled Longbeak	1.16	0.96	401.17	299.08		
Aesop Shrimp	3.70	3.61	1364.83	1332.36		
Northern Shrimp	1.75	1.63	130.00	120.47		
Jonah Crab	2.55	1.41	12.00	5.98	10.68	0.84
Rock Crab	0.28	0.21	1.33	0.80	9.88	1.62
Sea Urchin	0.00	0.00	0.17	0.17		
Starfish unclass.	2.48	1.35				
Boreal Asterias	1.21	1.02	2.67	1.76		
Sea Scallop	3.32	2.28	43.00	34.13	7.97	1.57
Ocean Quahog	0.01	0.01	0.33	0.33	5.00	
Northern Cardita	0.00	0.00	0.17	0.17	2.00	
Shortfin Squid	0.10	0.06	1.83	1.28	12.09	0.70
Longfin Squid	0.02	0.02	0.17	0.17	15.00	
Octopus unclass.	0.00	0.00	0.17	0.17	10.00	
Sponge unclass.	0.04	0.04				
					CL (mm)	(+/- mm)
Strata 4						
American Lobster	6.33	2.97	18.17	9.23	71.50	14.87
Spiny Dogfish	22.68	21.37	12.50	10.02	68.88	4.36
Little Skate	0.25	0.25	0.33	0.33	54.50	0.50
Smooth Skate	2.65	2.65	1.67	1.67	46.90	6.42
Thorny Skate	2.21	1.76	0.67	0.42	55.75	16.62
Atlantic Herring	19.94	6.17	156.67	50.06	23.14	1.41
Alewife	2.36	1.02	24.00	10.86	20.60	0.76

Appendix C Survey Catch Summaries

Survey Results July 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Silver Hake	112.29	38.50	1300.33	459.13	22.95	3.21
Atlantic Cod	2.99	2.53	4.33	1.58	24.23	5.59
Haddock	0.58	0.37	1.67	1.05	30.30	3.95
Pollock	0.26	0.22	1.67	1.48	25.10	1.28
White Hake	3.21	1.31	7.83	1.97	34.94	1.48
Red Hake	20.79	11.70	93.83	50.31	31.56	1.38
Fourbeard Rockling	0.12	0.07	2.00	1.41	22.50	1.06
American Plaice	15.52	7.50	152.33	76.95	25.26	2.09
Yellowtail Flounder	0.08	0.07	0.33	0.21	35.50	11.50
Winter Flounder	0.48	0.28	1.17	0.65	26.43	1.89
Witch Flounder	4.22	1.49	51.83	12.76	21.15	1.45
Atlantic Mackerel	0.02	0.02	0.17	0.17	23.00	
Butterfish	0.02	0.02	0.17	0.17	17.00	
Acadian Redfish	1.76	1.27	28.00	21.12	14.82	1.92
Longhorn Sculpin	0.45	0.18	2.50	0.96	25.27	1.02
Sea Raven	0.73	0.32	1.00	0.37	31.67	3.51
Alligatorfish	0.00	0.00	0.00	0.00	26.00	2.61
Lumpfish	0.69	0.33	0.67	0.33		
Ocean Pout	0.08	0.07	0.33	0.21	35.00	8.00
Goosefish	12.63	3.81	17.17	4.44	31.23	1.65
Pearlsides	0.00	0.00	0.17	0.17	5.00	
Sevenspine Bay Shrimp	0.00	0.00	0.83	0.83		
Bristled Longbeak	0.13	0.08	34.00	17.28		
Aesop Shrimp	0.02	0.01	4.83	1.72		
Northern Shrimp	3.75	3.21	382.00	322.35		
Jonah Crab	1.57	1.16	9.83	7.53	9.93	1.13
Rock Crab	0.01	0.01	0.17	0.17	6.00	
Northern Stone Crab	0.17	0.11	0.33	0.21	1.92	7.45
Snow Crab	0.02	0.02	0.33	0.33	7.00	
Starfish unclass.	0.01	0.01	0.33	0.33		
Boreal Asterias	0.02	0.02	0.17	0.17		
Sea Scallop	0.84	0.47	25.17	12.25	6.17	0.57
Shortfin Squid	0.43	0.32	6.17	4.10	14.16	0.92
Octopus unclass.	0.01	0.01	0.33	0.21	10.00	1.00
Toad Crab	0.01	0.01	0.17	0.17		
Sea sponges	0.10	0.10	0.17	0.17	4.00	
Anemone	0.32	0.25	0.67	0.49		
Barnacle	0.03	0.03	0.17	0.17		
					CL (mm)	(+/- mm)
American Lobster	1.31	0.64	1.17	0.31	103.86	45.36
Strata 5						
Spiny Dogfish	230.61	217.57	167.83	157.71	70.81	3.86
Winter Skate	0.10	0.10	0.17	0.17	41.00	
Smooth Skate	1.00	0.67	2.50	1.15	39.33	4.23
Thorny Skate	1.67	0.98	0.83	0.40	51.60	12.89

Appendix C

Survey Catch Summaries

Survey Results July 2001

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Atlantic Herring	2.22	1.43	16.17	8.87	23.47	1.15
Alewife	1.04	0.86	8.50	6.79	22.10	1.19
American Shad	0.02	0.02	0.33	0.33	16.50	2.50
Silver Hake	149.88	60.94	1959.83	1028.18	23.40	4.28
Atlantic Cod	4.81	2.86	3.83	1.60	35.96	5.31
Haddock	1.75	1.75	1.67	1.67	47.30	1.81
Pollock	0.91	0.68	1.50	0.67	33.11	6.51
White Hake	12.33	4.05	21.33	3.88	38.35	1.35
Red Hake	20.20	8.08	109.17	42.08	28.91	1.42
Fourbeard Rockling	0.20	0.10	4.50	3.15	20.63	1.01
American Plaice	7.34	2.79	52.17	22.16	24.14	1.28
Yellowtail Flounder	0.08	0.05	0.33	0.21	29.00	1.00
Winter Flounder	0.11	0.08	1.00	0.52	18.67	2.12
Witch Flounder	13.33	5.91	97.17	34.47	27.08	1.47
Acadian Redfish	22.47	13.85	167.33	104.33	19.63	2.86
Longhorn Sculpin	0.17	0.10	0.83	0.48	25.80	1.32
Sea Raven	0.38	0.29	0.33	0.21	35.00	6.00
Lumpfish	2.01	1.67	2.17	1.80	24.46	1.27
Ocean Pout	0.42	0.35	0.67	0.49	50.00	4.64
Goosefish	10.79	3.18	23.50	9.59	26.38	1.68
Sevenspine Bay Shrimp	0.01	0.01	1.17	1.17		
Bristled Longbeak	0.72	0.65	236.17	216.95		
Aesop Shrimp	0.02	0.01	4.00	2.97		
Shrimp (unclass)	0.24	0.24	32.67	32.67		
Northern Shrimp	1.71	0.78	173.67	82.35		
Red Crab	0.06	0.06	0.17	0.17	11.00	
Jonah Crab	1.17	0.31	7.67	2.76	9.43	0.84
Rock Crab	0.03	0.03	0.17	0.17	7.00	
Northern Stone Crab	0.15	0.15	0.50	0.50	9.33	1.20
Snow Crab	0.06	0.04	0.83	0.54	8.00	
Starfish unclass.	0.07	0.05	7.67	7.27		
Sea Scallop	1.67	1.36	62.67	53.10	5.93	1.43
Shortfin Squid	0.33	0.17	4.67	2.44	14.36	0.62
Octopus unclass.	0.10	0.08	0.83	0.48	10.20	0.92
Sea sponges	0.19	0.19				
American Lobster	0.19	0.12	0.83	0.65	CL (mm) 66.68	(+/- mm) 16.08

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Region 1						
Stratum 1						
Little Skate	0.719	0.445	0.857	0.553	49.000	3.209
Atlantic Herring	2.894	1.383	201.286	167.362	9.935	5.177
Alewife	0.231	0.153	12.571	8.766	11.659	0.785
Blueback Herring	0.001	0.001	0.143	0.143	10.000	
Rainbow Smelt	0.006	0.004	0.286	0.184	16.000	1.000
Silver Hake	0.136	0.115	5.000	3.395	15.571	1.266
Atlantic Cod	0.569	0.262	3.857	1.471	19.296	2.874
Red Hake	0.070	0.031	3.429	1.288	13.917	1.112
Fourbeard Rockling	0.009	0.009	0.143	0.143	24.000	
Atlantic Halibut	0.043	0.043	0.429	0.429	21.333	1.202
American Plaice	0.167	0.074	1.857	0.937	17.538	3.820
Yellowtail Flounder	3.459	2.214	12.571	8.118	32.125	1.064
Winter Flounder	4.633	1.160	48.429	9.317	18.715	0.996
Windowpane	0.037	0.037	0.143	0.143	29.000	
Atlantic Mackerel	0.057	0.057	0.286	0.286	27.500	4.500
Longhorn Sculpin	6.229	2.139	52.000	20.088	22.709	0.878
Sea Raven	0.686	0.427	0.857	0.459	31.833	2.738
Ocean Pout	0.183	0.183	0.286	0.286	49.500	0.500
Goosefish	0.129	0.102	0.571	0.429	22.250	1.768
Bristled Longbeak	0.004	0.004	0.571	0.571		
Jonah Crab	0.101	0.065	0.571	0.369	11.500	1.848
Rock Crab	0.171	0.147	0.571	0.429	12.250	0.854
Sand Dollar	0.016	0.011	2.000	1.397		
Starfish unclass.	0.001	0.001	0.143	0.143		
Sea Scallop	0.503	0.307	18.714	10.906	5.130	1.032
Sea sponges	0.029	0.029	0.143	0.143		
					CL (mm) (+/- mm)	
American Lobster	8.313	2.120	32.286	9.685	68.522	0.642
Region 1						
Stratum 2						
Little Skate	0.124	0.124	0.200	0.200	47.000	
Atlantic Herring	10.212	5.308	202.600	126.113	17.536	2.216
Alewife	35.754	6.288	1616.20	379.168	12.817	3.938
			0			
Blueback Herring	1.966	1.206	115.200	68.134	12.713	1.653
American Shad	1.026	0.385	23.600	7.201	16.257	0.861
Silver Hake	3.166	1.390	94.600	33.554	15.676	1.255
Atlantic Cod	13.068	10.655	6.000	2.345	51.036	5.001
Haddock	1.636	1.253	8.000	3.674	24.895	2.987
Pollock	0.668	0.383	8.600	4.946	20.047	1.078
White Hake	0.028	0.028	0.200	0.200	27.000	

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Red Hake	1.370	0.826	12.400	6.234	23.700	1.269
Fourbeard Rockling	0.016	0.016	0.200	0.200	24.000	
American Plaice	11.484	4.446	125.200	26.558	20.253	1.931
Fourspot Flounder	0.084	0.084	0.400	0.400	26.000	3.000
Yellowtail Flounder	3.778	0.985	11.800	2.853	33.250	0.876
Winter Flounder	2.582	1.031	18.200	10.361	23.288	1.581
Witch Flounder	0.006	0.006	0.200	0.200	26.000	
Windowpane	0.060	0.051	0.800	0.490	18.000	3.240
Longhorn Sculpin	4.634	1.915	56.600	25.367	19.678	1.227
Sea Raven	0.436	0.436	0.400	0.400	36.000	4.000
Snakeblenny	0.020	0.015	0.800	0.583	30.000	
Ocean Pout	0.268	0.201	0.800	0.374	40.250	4.366
Goosefish	0.986	0.392	4.200	2.498	21.947	1.593
Bristled Longbeak	0.074	0.033	20.800	9.281		
Aesop Shrimp	0.014	0.012	3.400	2.713		
Northern Shrimp	0.016	0.016	3.600	3.600		
Jonah Crab	0.096	0.041	0.600	0.245	10.667	0.333
Starfish unclass.	0.024	0.024	0.000	0.000		
Sea Scallop	0.012	0.012	0.200	0.200	6.000	
					CL (mm) (+/- mm)	
American Lobster	18.828	8.475	92.800	42.569	63.603	0.496
Region 1						
Stratum 3						
Spiny Dogfish	0.874	0.570	0.286	0.184	16.696	3.482
Little Skate	0.060	0.060	0.143	0.143	44.000	
Thorny Skate	1.650	0.724	0.571	0.202	63.500	6.702
Atlantic Herring	30.090	8.746	219.571	70.260	24.078	1.679
Alewife	4.641	1.397	104.286	48.628	13.068	1.965
Blueback Herring	0.011	0.011	0.571	0.571	12.289	3.888
American Shad	0.107	0.054	2.286	1.085	17.000	0.602
Silver Hake	51.007	21.623	838.857	173.326	18.894	3.226
Atlantic Cod	12.639	4.915	6.429	0.972	47.848	3.595
Haddock	9.979	3.357	10.429	3.077	44.787	1.163
Pollock	0.111	0.075	1.000	0.577	22.286	1.892
White Hake	0.880	0.344	5.286	2.504	27.973	0.912
Red Hake	7.707	1.813	44.571	8.968	28.946	0.867
Fourbeard Rockling	0.021	0.017	0.429	0.297	20.667	1.453
American Plaice	17.457	2.891	167.429	31.008	21.834	1.137
Fourspot Flounder	0.117	0.057	0.571	0.297	30.250	1.181
Yellowtail Flounder	5.339	0.971	17.571	2.680	32.438	0.538
Winter Flounder	0.689	0.273	1.857	0.911	26.167	1.497
Witch Flounder	0.437	0.166	6.286	2.317	20.341	1.617
Acadian Redfish	0.460	0.203	9.571	3.847	21.914	1.221

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Longhorn Sculpin	0.123	0.059	1.143	0.508	35.500	2.918
Sea Raven	0.794	0.307	0.857	0.261	32.000	
Lumpfish	0.220	0.220	0.143	0.143	23.000	
Wrymouth	0.011	0.011	0.143	0.143	38.000	
Ocean Pout	0.121	0.080	0.286	0.184	47.000	3.000
Goosefish	6.491	1.477	13.000	2.582	28.839	0.962
Bristled Longbeak	0.213	0.069	68.429	28.923		
Aesop Shrimp	0.011	0.010	4.143	3.979		
Northern Shrimp	1.854	0.667	599.571	241.481		
Jonah Crab	0.040	0.026	0.429	0.297	9.333	0.333
Northern Stone Crab	0.017	0.017	0.143	0.143		
Starfish unclass.	0.023	0.015	1.143	0.986		
Dog Whelk (unclass.)	0.003	0.003	0.143	0.143		
Sea Scallop	0.054	0.035	1.714	0.778	5.083	0.807
					CL (mm) (+/- mm)	
American Lobster	2.937	1.036	6.571	2.707	79.239	2.067
Region 2						
Stratum 1						
Little Skate	0.377	0.183	0.429	0.202	52.333	1.202
Atlantic Herring	12.496	6.363	853.286	482.813	12.008	5.306
Alewife	5.700	5.657	345.000	341.838	11.362	4.306
Blueback Herring	0.004	0.004	0.143	0.143	14.000	
American Shad	0.011	0.011	0.143	0.143	18.000	
Rainbow Smelt	0.117	0.082	3.429	2.487	15.917	0.988
Silver Hake	0.183	0.142	8.571	6.661	14.683	0.727
Atlantic Cod	0.266	0.114	5.714	2.634	16.146	0.846
Haddock	0.003	0.003	0.143	0.143	14.000	
Pollock	0.084	0.070	1.857	1.262	18.154	0.571
White Hake	0.014	0.014	0.143	0.143	24.000	
Red Hake	0.099	0.051	3.571	2.224	15.600	0.716
Atlantic Halibut	0.277	0.145	2.286	1.358	20.500	1.180
American Plaice	0.027	0.013	1.286	0.714	12.667	1.570
Yellowtail Flounder	0.126	0.067	0.571	0.297	30.500	1.500
Winter Flounder	1.730	0.453	42.571	10.476	14.304	0.789
Windowpane	0.149	0.090	2.857	1.519	15.600	1.243
Longhorn Sculpin	7.776	3.615	77.000	38.867	21.801	0.909
Sea Raven	0.020	0.013	0.286	0.184	13.000	1.000
Grubby	0.004	0.004	0.143	0.143	9.000	
Lumpfish	0.119	0.110	0.286	0.184	15.500	7.500
Goosefish	0.037	0.037	0.143	0.143	24.000	
Rough Scad	0.003	0.003	0.286	0.286		
Sevenspine Bay Shrimp	0.010	0.008	2.714	2.254		
Bristled Longbeak	0.001	0.001	0.143	0.143		

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Aesop Shrimp	0.011	0.011	8.714	8.714		
Rock Crab	0.063	0.030	0.429	0.202	10.333	0.333
Starfish unclass.	0.001	0.001	0.143	0.143		
Hermit Crab (unclass.)	0.004	0.004	0.143	0.143		
Blue Mussel	0.014	0.014	0.143	0.143		
Atlantic Sturgeon	3.037	3.037	0.286	0.286	120.000	15.000
Sea Scallop	0.051	0.051	5.000	5.000	4.143	1.554
Atlantic Tomcod	0.020	0.020	0.429	0.429	18.667	0.882
Longfin Squid	0.081	0.053	1.143	0.738	14.750	1.176
American Sand Lance	0.020	0.017	5.571	5.407	11.921	1.600
Toad Crab	0.014	0.014	0.286	0.286	3.500	0.500
Sea sponges	0.250	0.250	0.000	0.000		
Anemone	0.014	0.014	1.143	1.143		
					CL (mm) (+/- mm)	
American Lobster	61.304	17.098	242.000	65.021	65.448	0.311
Region 2						
Stratum 2						
Little Skate	0.296	0.193	0.429	0.297	46.914	23.787
Atlantic Herring	34.404	16.533	1135.43	643.642	16.730	1.669
Alewife	4.221	1.773	142.571	51.218	17.226	2.867
American Shad	0.130	0.060	4.286	2.055	17.146	2.956
Rainbow Smelt	0.003	0.003	0.143	0.143	17.000	
Silver Hake	1.779	0.564	82.571	28.712	16.010	2.030
Atlantic Cod	0.040	0.010	1.143	0.261	17.771	3.259
Haddock	2.534	1.582	2.857	1.908	46.647	12.659
Pollock	0.027	0.016	0.857	0.404	17.256	2.078
White Hake	0.193	0.106	1.857	0.884	24.495	5.846
Red Hake	0.591	0.145	10.143	2.955	22.382	3.671
Fourbeard Rockling	0.023	0.011	0.429	0.202	23.845	6.968
Atlantic Halibut	0.011	0.011	0.143	0.143	22.000	
American Plaice	7.927	3.825	70.714	27.773	26.983	3.694
Yellowtail Flounder	0.264	0.133	1.286	0.680	30.047	8.065
Winter Flounder	0.276	0.053	6.286	1.107	15.222	2.707
Windowpane	0.200	0.080	4.000	1.069	16.784	4.352
Gulf Stream Flounder	0.003	0.003	0.143	0.143	13.000	
Acadian Redfish	0.044	0.019	1.000	0.535	13.649	3.998
Longhorn Sculpin	12.533	2.277	153.286	44.576	21.847	2.335
Sea Raven	0.609	0.605	0.857	0.705	34.929	28.820
Alligatorfish	0.003	0.003	0.286	0.286	13.077	3.595
Cunner	0.007	0.007	0.143	0.143	15.000	
Snakeblenny	0.007	0.007	0.714	0.714	25.706	6.802
Daubed Shanny	0.001	0.001	0.143	0.143	12.000	
Wrymouth	0.041	0.027	0.286	0.184	35.257	17.683

Appendix C Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Goosefish	0.654	0.341	1.143	0.553	35.530	30.673
Sevenspine Bay Shrimp	0.007	0.005	2.857	2.262		
Bristled Longbeak	0.249	0.140	250.857	161.760		
Aesop Shrimp	1.463	1.002	650.571	482.036		
Northern Shrimp	0.017	0.007	5.714	3.393		
Jonah Crab	0.257	0.133	1.286	0.644	11.345	2.802
Starfish unclass.	0.010	0.007	1.429	0.922		
Horse Mussel	0.283	0.283	1.000	1.000		
Shortfin Squid	0.020	0.020	0.143	0.143	19.000	
Anemone	0.046	0.046	0.857	0.857		
					CL (mm) (+/- mm)	
American Lobster	63.216	14.913	365.714	91.231	58.797	0.230
Region 2						
Stratum 3						
Spiny Dogfish	0.950	0.950	0.333	0.333	82.439	54.187
Winter Skate	0.250	0.250	0.167	0.167	65.000	
Little Skate	0.693	0.342	1.000	0.516	47.232	17.561
Atlantic Herring	1.997	1.211	39.500	29.285	20.481	2.634
Alewife	5.347	1.796	58.333	15.985	20.010	2.801
American Shad	0.057	0.046	1.000	0.816	16.663	2.056
Silver Hake	5.097	0.822	230.333	33.325	18.746	2.581
Atlantic Cod	3.255	2.390	3.000	1.693	48.214	31.432
Haddock	2.432	0.831	4.833	1.887	39.915	13.726
Pollock	0.067	0.067	1.333	1.333	17.571	2.695
White Hake	0.683	0.156	6.167	1.302	25.615	2.400
Red Hake	3.072	1.335	19.167	7.769	29.636	4.395
Fourbeard Rockling	0.147	0.096	2.167	1.195	25.030	4.917
American Plaice	16.717	2.499	131.500	23.460	27.499	3.384
Fourspot Flounder	0.063	0.041	0.333	0.211	29.034	5.382
Yellowtail Flounder	1.547	0.748	5.833	2.469	31.600	3.286
Winter Flounder	0.425	0.206	2.667	1.116	25.764	15.271
Witch Flounder	0.042	0.027	0.333	0.211	27.509	2.622
Windowpane	0.020	0.016	0.333	0.211	14.000	
Gulf Stream Flounder	0.003	0.002	0.333	0.211	13.077	3.595
Acadian Redfish	0.378	0.113	9.000	2.805	14.213	1.486
Longhorn Sculpin	7.353	1.457	47.500	8.433	24.433	2.646
Sea Raven	0.410	0.382	1.167	0.401	28.478	27.364
Alligatorfish	0.002	0.002	0.167	0.167	11.000	
Cunner	0.017	0.017	0.167	0.167	14.000	
Daubed Shanny	0.003	0.003	0.333	0.333	14.071	3.732
Wrymouth	0.010	0.010	0.167	0.167	35.000	
Ocean Pout	0.030	0.030	0.167	0.167	36.000	
Goosefish	3.777	0.897	9.000	1.592	31.236	9.125

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Sevenspine Bay Shrimp	0.027	0.017	3.667	2.028		
Bristled Longbeak	1.118	0.379	987.333	415.040		
Aesop Shrimp	1.185	0.865	696.500	535.394		
Northern Shrimp	1.565	0.596	804.500	304.250		
Jonah Crab	1.613	1.165	7.167	4.277	11.256	1.598
Rock Crab	0.020	0.020	0.167	0.167	10.000	
Sea Scallop	0.192	0.095	3.500	1.727	7.816	1.117
Octopus unclass.	0.007	0.007	0.167	0.167	11.000	
Toad Crab	0.002	0.002	0.167	0.167	2.000	
Sea Cucumber	0.023	0.023	51.333	51.333		
					CL (mm) (+/- mm)	
American Lobster	7.483	3.413	25.667	11.724	67.805	1.102
Region 3						
Stratum 1						
Atlantic Hagfish	0.030	0.030	0.167	0.167	60.000	
Little Skate	0.110	0.110	0.167	0.167	42.000	
Atlantic Herring	124.958	64.901	7051.00	3724.885	12.795	7.280
Alewife	0.120	0.044	8.667	4.558	9.981	0.857
American Shad	0.003	0.003	0.167	0.167	16.000	
Rainbow Smelt	0.043	0.036	2.167	1.778	14.615	0.709
Silver Hake	0.098	0.069	4.000	2.769	15.458	0.769
Atlantic Cod	0.030	0.016	0.833	0.477	16.800	1.881
Pollock	0.003	0.003	0.167	0.167	18.000	
Red Hake	0.063	0.035	1.833	0.833	18.727	1.214
Fourbeard Rockling	0.017	0.017	0.333	0.333	21.000	3.000
Winter Flounder	0.967	0.244	17.333	5.840	16.250	0.758
Windowpane	0.163	0.051	4.833	1.302	13.897	0.927
Acadian Redfish	0.007	0.007	0.333	0.333	13.000	4.000
Moustache Sculpin	0.002	0.002	0.167	0.167	9.000	
Longhorn Sculpin	2.467	1.533	33.667	20.728	18.708	1.607
Sea Raven	0.150	0.096	1.167	0.833	17.286	1.899
Lumpfish	0.003	0.003	0.167	0.167	6.000	
Cunner	0.017	0.017	0.167	0.167	19.000	
Snakeblenny	0.005	0.005	0.667	0.667	19.750	1.315
Daubed Shanny	0.002	0.002	0.167	0.167	16.000	
Wrymouth	0.017	0.013	0.333	0.211	29.500	4.500
Sevenspine Bay Shrimp	0.272	0.205	89.833	64.918		
Bristled Longbeak	0.012	0.007	4.167	2.535		
Aesop Shrimp	0.790	0.346	309.167	139.304		
Jonah Crab	0.177	0.177	0.500	0.500	13.667	0.882
Rock Crab	0.280	0.094	2.333	0.760	9.143	0.712
Starfish unclass.	0.053	0.034	0.333	0.333		
Boreal Asterias	0.095	0.061	1.667	1.667		

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Sea Scallop	0.003	0.003	0.167	0.167	4.000	
Toad Crab	0.005	0.003	0.500	0.342	2.667	0.577
Sea Cucumber	0.053	0.053	0.167	0.167		
Thorny Skate	0.020	0.020	0.167	0.167	27.000	
					CL (mm) (+/- mm)	
American Lobster	32.197	19.112	153.167	93.674	63.164	0.324
Region 3						
Stratum 2						
Atlantic Herring	39.752	33.713	2455.50	1784.476	13.000	5.439
Alewife	0.673	0.221	21.833	5.134	12.344	1.063
American Shad	0.037	0.018	1.000	0.365	15.667	0.931
Rainbow Smelt	0.037	0.021	1.000	0.516	14.500	1.573
Silver Hake	0.633	0.394	28.833	17.988	14.960	1.047
Atlantic Cod	0.013	0.008	0.500	0.342	16.000	1.155
Haddock	0.087	0.057	1.833	1.167	17.273	0.583
Pollock	0.025	0.020	0.500	0.342	17.000	1.528
White Hake	0.120	0.068	1.000	0.632	25.000	2.066
Red Hake	0.385	0.221	5.833	4.110	21.486	1.342
American Plaice	1.180	0.742	16.667	11.035	19.162	1.459
Winter Flounder	0.498	0.150	11.000	3.141	14.667	0.824
Windowpane	0.403	0.103	10.333	3.556	13.306	0.792
Acadian Redfish	0.007	0.007	0.500	0.500	7.667	4.177
Longhorn Sculpin	1.413	0.981	21.667	15.935	18.246	1.450
Sea Raven	0.187	0.153	1.167	0.601	16.429	4.711
Alligatorfish	0.002	0.002	0.167	0.167	10.000	
Lumpfish	0.005	0.005	0.333	0.333	6.500	1.500
Goosefish	0.012	0.012	0.167	0.167	13.000	
Sevenspine Bay Shrimp	0.233	0.151	54.333	33.356		
Bristled Longbeak	0.377	0.191	159.167	72.534		
Aesop Shrimp	2.368	0.970	1092.17	541.723		
Northern Shrimp	0.025	0.016	11.000	10.208		
Jonah Crab	0.087	0.057	0.500	0.342	11.000	1.000
Rock Crab	0.417	0.136	2.833	1.108	10.235	0.550
Starfish unclass.	0.072	0.045	0.500	0.500		
Boreal Asterias	0.180	0.180	0.000	0.000		
Sea Scallop	0.008	0.004	0.500	0.224	4.667	0.882
Longfin Squid	0.010	0.007	0.333	0.211	11.000	2.000
Anemone	0.003	0.003	0.167	0.167		
					CL (mm) (+/- mm)	
American Lobster	13.950	7.254	59.167	33.430	67.308	0.970
Region 3						
Stratum 3						
Little Skate	0.445	0.167	0.833	0.307	40.400	3.501

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Atlantic Herring	10.127	4.571	354.667	139.490	15.339	1.615
Alewife	0.213	0.119	8.167	3.798	12.694	0.875
Silver Hake	2.213	1.238	76.333	41.691	15.672	0.973
Atlantic Cod	0.088	0.057	1.333	0.955	18.625	1.214
Haddock	0.020	0.020	0.333	0.333	17.500	0.500
Pollock	0.087	0.045	1.667	0.803	17.500	0.786
White Hake	0.323	0.169	2.167	1.046	26.462	0.545
Red Hake	0.482	0.211	4.667	2.108	24.786	1.355
Fourbeard Rockling	0.090	0.043	1.667	0.760	21.700	1.136
American Plaice	1.820	0.680	13.500	5.602	23.284	1.145
Yellowtail Flounder	0.033	0.033	0.167	0.167	31.000	
Winter Flounder	0.200	0.068	2.167	0.477	18.308	1.190
Windowpane	0.110	0.072	1.333	0.882	19.000	0.816
Acadian Redfish	0.167	0.033	2.500	0.563	15.933	0.530
Longhorn Sculpin	4.397	0.443	44.833	2.774	20.178	0.820
Sea Raven	3.597	0.926	6.167	1.167	27.946	1.437
Alligatorfish	0.003	0.003	0.167	0.167	11.000	
Snakeblenny	0.017	0.011	0.500	0.342	26.333	2.603
Daubed Shanny	0.003	0.003	0.167	0.167	12.000	
Wrymouth	0.013	0.013	0.167	0.167	29.000	
Goosefish	0.370	0.370	1.333	1.333	23.125	3.035
Sevenspine Bay Shrimp	0.003	0.002	0.500	0.342		
Bristled Longbeak	2.388	0.575	744.500	182.820		
Aesop Shrimp	2.613	0.897	940.333	338.703		
Northern Shrimp	0.448	0.215	109.833	48.424		
Jonah Crab	0.747	0.306	2.833	0.946	12.381	0.745
Rock Crab	0.083	0.056	0.500	0.342	10.400	0.400
Sea Urchin	0.002	0.002	0.167	0.167	3.000	
Starfish unclass.	0.210	0.172	30.667	30.667		
Boreal Asterias	0.010	0.010	0.167	0.167		
Sea Scallop	2.593	1.142	30.833	12.773	8.600	0.774
Octopus unclass.	0.010	0.010	0.167	0.167	14.000	
Sea sponges	0.067	0.042	0.167	0.167		
Sea Cucumber	2.615	1.789	7647.16	7008.477		
					CL (mm) (+/- mm)	
American Lobster	12.515	4.109	18.500	8.962	70.883	1.160
Region 4						
Stratum 1						
Little Skate	0.144	0.144	0.200	0.200	47.000	
Atlantic Herring	27.104	13.258	1437.60	707.321	13.015	3.580
Alewife	0.068	0.031	5.600	2.694	9.429	0.668
Rainbow Smelt	0.076	0.042	2.000	1.304	16.100	0.751
Silver Hake	0.048	0.035	1.800	1.200	15.556	1.293

Appendix C Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Atlantic Cod	0.976	0.902	22.800	20.841	16.491	1.465
Pollock	0.004	0.004	0.200	0.200	15.000	
Red Hake	0.090	0.078	3.000	2.530	16.571	1.008
Atlantic Halibut	0.056	0.034	0.600	0.400	20.667	1.764
Winter Flounder	0.450	0.300	17.000	13.084	12.165	1.303
Windowpane	0.006	0.004	0.800	0.583	9.000	0.913
Longhorn Sculpin	0.988	0.632	27.000	22.821	13.864	1.753
Sea Raven	0.080	0.066	0.800	0.583	15.750	3.146
Alligatorfish	0.002	0.002	0.200	0.200	8.000	
Sevenspine Bay Shrimp	0.542	0.324	125.400	71.136		
Spiny Lebbeid	0.002	0.002	0.400	0.400		
Bristled Longbeak	0.022	0.014	8.400	5.144		
Aesop Shrimp	1.282	1.140	556.200	509.294		
Jonah Crab	0.076	0.032	0.600	0.245	8.667	0.667
Rock Crab	0.220	0.086	2.400	1.077	7.833	0.597
Sand Dollar	0.008	0.008	0.200	0.200		
Starfish unclass.	0.036	0.036	0.000	0.000	2.000	
Boreal Asterias	0.286	0.254	1.800	1.562		
Blue Mussel	0.028	0.028	1.200	1.200		
Toad Crab	0.008	0.004	1.400	0.748	2.857	0.378
Sea sponges	0.272	0.272	0.000	0.000		
Sea Cucumber	34.424	28.743	47.800	38.195		
Anemone	0.300	0.191	5.000	5.000		
					CL (mm) (+/- mm)	
American Lobster	30.066	9.649	114.000	39.869	66.682	0.464
Region 4						
Stratum 2						
Atlantic Herring	4.595	3.351	230.000	165.726	13.542	1.240
Alewife	0.630	0.211	42.000	18.956	9.994	1.185
American Shad	0.038	0.013	0.750	0.250	16.333	1.202
Rainbow Smelt	0.025	0.025	1.000	1.000	15.000	0.577
Silver Hake	0.923	0.462	32.000	16.202	15.766	1.099
Atlantic Cod	1.475	1.448	29.000	28.337	17.741	1.776
Haddock	0.740	0.740	16.000	16.000	17.203	1.565
Pollock	0.008	0.008	0.250	0.250	15.000	
White Hake	0.075	0.075	0.750	0.750	23.667	2.848
Red Hake	0.745	0.306	17.500	8.799	18.200	1.212
Fourbeard Rockling	0.025	0.025	0.500	0.500	22.000	1.000
Atlantic Halibut	0.018	0.018	0.250	0.250	20.000	
American Plaice	1.170	0.834	6.750	4.308	24.519	1.956
Winter Flounder	1.210	0.799	25.250	20.279	15.287	1.533
Windowpane	0.223	0.078	10.750	5.023	11.070	0.906
Acadian Redfish	0.005	0.005	0.250	0.250	6.000	

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Moustache Sculpin	0.005	0.005	0.250	0.250	11.000	
Longhorn Sculpin	6.770	4.561	141.000	95.868	16.193	1.867
Sea Raven	0.360	0.360	7.250	7.250	12.690	2.528
Alligatorfish	0.030	0.024	8.000	7.670	11.250	1.234
Snakeblenny	0.008	0.008	0.500	0.500	19.000	1.000
Daubed Shanny	0.008	0.005	0.500	0.289	11.500	0.500
Wrymouth	0.020	0.020	0.250	0.250	35.000	
Goosefish	0.020	0.020	0.250	0.250	15.000	
Sevenspine Bay Shrimp	0.685	0.611	244.750	200.234		
Bristled Longbeak	1.585	1.290	691.750	559.555		
Aesop Shrimp	15.815	9.820	6323.75	4130.164		
Northern Shrimp	0.223	0.126	37.750	25.028		
Jonah Crab	0.095	0.059	0.500	0.289	11.500	1.500
Rock Crab	0.355	0.091	2.750	0.479	9.091	1.217
Starfish unclass.	0.020	0.020	1.500	1.500		
Boreal Asterias	0.483	0.209	0.000	0.000		
Sea Scallop	0.015	0.015	0.250	0.250	10.000	
Toad Crab	0.003	0.003	0.250	0.250	2.000	
Sea Cucumber	0.605	0.605	1.500	1.500		
					CL (mm) (+/- mm)	
American Lobster	8.798	4.151	29.250	13.592	69.410	1.129
Region 4						
Stratum 3						
Little Skate	0.267	0.139	0.333	0.167	46.333	2.603
Atlantic Herring	12.558	3.260	447.333	111.781	14.786	1.429
Alewife	0.782	0.190	23.889	8.080	12.935	0.745
Blueback Herring	0.089	0.089	0.889	0.889	19.875	0.911
American Shad	0.264	0.126	4.889	2.469	16.750	0.525
Rainbow Smelt	0.002	0.002	0.111	0.111	18.000	
Silver Hake	44.729	19.673	1061.67	446.339	18.142	2.209
Atlantic Cod	0.098	0.038	1.556	0.556	18.786	0.811
Haddock	0.713	0.328	4.889	1.679	20.341	2.286
Pollock	0.076	0.076	0.222	0.222	31.000	1.000
White Hake	0.693	0.257	5.444	2.076	25.612	1.172
Red Hake	1.164	0.319	11.556	2.698	23.654	0.891
Fourbeard Rockling	0.096	0.054	1.889	0.992	21.176	1.131
Greenland Halibut	0.006	0.006	0.111	0.111	19.000	
Atlantic Halibut	1.602	1.370	0.444	0.294	64.500	10.555
American Plaice	2.251	0.559	11.222	2.717	26.250	0.944
Yellowtail Flounder	0.136	0.062	0.556	0.242	31.200	1.393
Winter Flounder	0.836	0.246	8.444	2.461	18.000	1.176
Witch Flounder	0.261	0.129	6.556	4.311	15.983	1.711
Windowpane	0.227	0.075	3.111	1.060	18.321	0.514

Appendix C Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Butterfish	0.006	0.006	0.111	0.111	15.000	
Acadian Redfish	0.020	0.012	0.667	0.373	13.667	2.224
Shorthorn Sculpin	0.096	0.096	0.111	0.111	37.000	
Longhorn Sculpin	5.002	1.440	69.000	24.412	18.217	0.757
Sea Raven	0.798	0.282	2.000	0.687	25.000	1.835
Alligatorfish	0.003	0.002	0.222	0.147	13.500	0.500
Lumpfish	0.118	0.118	0.111	0.111	28.000	
Snakeblenny	0.022	0.018	0.667	0.441	27.333	1.944
Wrymouth	0.006	0.006	0.333	0.333	15.000	0.577
Goosefish	1.956	0.932	2.333	0.601	27.810	3.898
Pearlsides	0.001	0.001	0.111	0.111	4.000	
Sevenspine Bay Shrimp	0.010	0.010	2.000	2.000		
Bristled Longbeak	2.127	0.756	538.667	184.906		
Aesop Shrimp	2.298	0.699	727.778	253.051		
Northern Shrimp	2.136	1.825	612.222	536.881		
Jonah Crab	4.418	2.098	22.111	10.166	10.965	0.595
Rock Crab	0.764	0.661	3.000	2.315	11.630	0.982
Snow Crab	0.020	0.018	0.222	0.147	5.000	3.000
Starfish unclass.	0.320	0.288	0.000	0.000		
Boreal Asterias	0.769	0.769	0.000	0.000		
Sea Scallop	8.603	3.089	122.889	44.902	8.234	0.880
Northern Cardita	0.244	0.244	141.778	141.778		
Waved Astarte	1.858	1.858	576.889	576.889		
Shortfin Squid	0.002	0.002	0.111	0.111	9.000	
Longfin Squid	0.053	0.032	0.333	0.167	18.667	3.756
Octopus unclass.	0.011	0.011	0.444	0.444	12.000	1.915
Toad Crab	0.002	0.002	0.111	0.111	4.000	
Sea Cucumber	11.504	9.148	57522.2	45739.691		
					CL (mm) (+/- mm)	
American Lobster	6.949	0.919	11.889	3.098	80.383	2.370
Region 5						
Stratum 1						
Atlantic Herring	108.167	61.343	6000.33	3231.872	12.980	7.081
Alewife	0.053	0.044	5.000	4.509	9.733	0.760
American Shad	0.013	0.013	0.333	0.333	15.000	
Rainbow Smelt	0.013	0.013	0.333	0.333	18.000	
Silver Hake	0.047	0.029	1.333	0.882	16.250	1.601
Atlantic Cod	0.153	0.093	4.000	2.309	15.750	1.037
White Hake	0.020	0.020	0.333	0.333	21.000	
Red Hake	0.183	0.093	1.667	0.882	22.000	3.271
Winter Flounder	0.733	0.273	8.000	2.000	16.458	2.062
Acadian Redfish	0.007	0.007	0.333	0.333	18.000	1.000
Shorthorn Sculpin	0.407	0.407	0.333	0.333	11.000	

Appendix C Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Longhorn Sculpin	0.700	0.383	11.667	4.631	40.000	
Alligatorfish	0.047	0.047	1.333	1.333	17.424	1.199
Sevenspine Bay Shrimp	0.020	0.012	4.000	2.309	12.250	0.677
Bristled Longbeak	0.007	0.007	1.667	1.667		
Aesop Shrimp	0.360	0.350	164.667	158.704		
Northern Shrimp	0.003	0.003	0.333	0.333		
Jonah Crab	0.220	0.070	1.000	0.000	11.000	1.528
Rock Crab	0.013	0.013	0.333	0.333	7.000	
Boreal Asterias	0.007	0.007	0.333	0.333		
Longfin Squid	0.033	0.033	0.667	0.667	12.500	2.500
Toad Crab	0.007	0.007	0.333	0.333	3.000	
Sea Cucumber	0.133	0.133	0.333	0.333		
					CL (mm) (+/- mm)	
American Lobster	58.763	17.114	224.000	68.061	65.827	0.419
Region 5						
Stratum 2						
Spiny Dogfish	0.360	0.360	0.167	0.167	83.000	
Little Skate	0.380	0.283	1.167	0.980	32.429	5.094
Atlantic Herring	19.667	12.807	555.167	335.989	13.116	2.489
Alewife	1.408	0.722	53.333	24.503	12.209	1.412
Blueback Herring	1.698	1.252	46.667	38.766	14.879	1.215
American Shad	0.082	0.038	1.500	0.671	16.167	0.665
Rainbow Smelt	0.005	0.005	0.167	0.167	15.000	
Silver Hake	0.797	0.461	19.667	9.715	17.661	0.894
Atlantic Cod	0.103	0.050	2.333	0.919	17.143	0.628
Haddock	0.993	0.631	19.000	11.628	17.754	0.718
Pollock	0.083	0.056	1.333	0.803	18.714	1.175
White Hake	0.283	0.248	3.000	2.608	22.611	2.861
Red Hake	0.430	0.198	6.833	4.110	19.390	1.588
Atlantic Halibut	0.017	0.017	0.333	0.333	19.667	2.887
American Plaice	0.578	0.174	5.000	1.826	23.667	1.316
Winter Flounder	5.980	1.523	74.833	34.869	16.953	1.272
Windowpane	0.007	0.007	0.167	0.167	19.000	
Butterfish	0.017	0.017	0.333	0.333	14.500	1.500
Acadian Redfish	0.007	0.007	0.167	0.167	15.000	
Shorthorn Sculpin	0.113	0.113	0.167	0.167	35.000	
Longhorn Sculpin	1.383	0.779	20.167	11.418	18.430	0.816
Sea Raven	0.737	0.524	1.500	0.957	26.417	1.607
Alligatorfish	0.048	0.032	13.667	8.697	10.890	0.780
Ocean Pout	0.017	0.011	0.500	0.342	18.667	2.728
Goosefish	0.297	0.211	0.333	0.211	39.500	6.500
Sevenspine Bay Shrimp	0.002	0.002	0.333	0.333		
Bristled Longbeak	0.077	0.052	28.667	19.807		

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean Weight (kg.)	Std. Error (+/-) (kg.)	Mean Number	Std. Error (+/-)	Mean Length (cm)	Std. Error (+/-) (cm)
Aesop Shrimp	1.565	0.774	651.167	376.083		
Jonah Crab	0.920	0.296	4.167	1.327	11.280	0.511
Rock Crab	0.080	0.057	0.500	0.342	11.667	0.667
Boreal Asterias	0.023	0.017	0.000	0.000		
Sea Scallop	0.133	0.069	1.500	0.719	7.667	1.225
Octopus unclass.	0.003	0.003	0.167	0.167	7.000	
Toad Crab	0.010	0.005	0.667	0.333	2.750	0.250
Sea Cucumber	0.053	0.053	0.000	0.000		
Spiny Dogfish	0.752	0.505	0.400	0.267	76.500	1.041
					CL (mm) (+/- mm)	
American Lobster	26.012	4.389	90.167	11.336	67.991	0.495
Region 5						
Stratum 3						
Little Skate	0.700	0.394	0.800	0.512	48.125	3.120
Smooth Skate	0.182	0.124	2.000	1.606	31.200	3.635
Thorny Skate	0.843	0.785	0.400	0.306	39.750	14.851
Atlantic Herring	1.874	1.644	69.700	57.566	14.321	1.419
Alewife	0.966	0.465	16.400	7.358	15.739	0.799
Blueback Herring	0.045	0.045	0.900	0.900	17.000	1.414
American Shad	0.169	0.124	2.700	1.938	18.852	1.102
Silver Hake	34.924	32.324	862.300	782.109	17.975	2.107
Atlantic Cod	5.290	4.031	6.400	2.252	30.484	3.117
Haddock	0.278	0.188	4.200	3.870	18.690	2.567
Pollock	0.009	0.006	0.200	0.133	18.000	1.000
White Hake	0.455	0.266	3.300	1.777	22.143	2.699
Red Hake	0.991	0.405	7.100	2.877	26.803	1.031
Fourbeard Rockling	0.032	0.024	1.100	0.795	18.727	1.203
Greenland Halibut	0.002	0.002	0.100	0.100	17.000	
American Plaice	0.285	0.100	1.900	0.722	24.158	1.884
Yellowtail Flounder	0.034	0.034	0.200	0.200	28.000	1.000
Winter Flounder	10.147	4.180	46.700	17.259	25.113	0.901
Witch Flounder	1.296	0.979	8.200	5.836	29.268	1.323
Acadian Redfish	0.078	0.071	0.800	0.416	9.875	3.997
Longhorn Sculpin	1.959	0.653	19.900	7.021	20.859	0.664
Sea Raven	3.559	1.146	5.300	1.484	32.170	1.030
Alligatorfish	0.005	0.003	0.800	0.593	11.625	0.574
Lumpfish	0.446	0.446	0.100	0.100	44.000	
Seasnail	0.001	0.001	0.100	0.100	36.111	1.567
Ocean Pout	0.576	0.308	2.700	1.257	36.133	3.207
Goosefish	1.312	0.752	1.500	0.637	5.000	
Pearlsides	0.001	0.001	0.100	0.100		
Bristled Longbeak	0.135	0.043	48.600	16.235		
Aesop Shrimp	1.055	0.338	309.300	104.739		

Appendix C

Survey Catch Summaries

Survey Results Spring 2002

	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error
	Weight	(+/-)	Number	(+/-)	Length	(+/-)
	(kg.)	(kg.)			(cm)	(cm)
Northern Shrimp	0.217	0.129	29.200	14.542		
Jonah Crab	1.066	0.393	5.800	2.144	10.362	0.481
Rock Crab	0.168	0.073	1.000	0.394	11.500	1.184
Sea Urchin	0.004	0.004	0.100	0.100	6.000	
Starfish unclass.	0.106	0.076	1.200	0.663		
Boreal Asterias	0.020	0.020	0.600	0.600		
Sea Scallop	0.755	0.432	10.100	6.428	8.020	0.976
Longfin Squid	0.022	0.015	0.200	0.133	17.000	3.000
Toad Crab	0.001	0.001	0.100	0.100	1.000	
Sea sponges	0.240	0.240	0.000	0.000		
Sea Cucumber	0.116	0.109	0.100	0.100		
					CL (mm) (+/- mm)	
American Lobster	6.175	1.886	13.500	4.865	76.696	1.673

Appendix D

Policy on Release of Trawl Survey Data

When the Maine - New Hampshire Inshore Groundfish Trawl Survey was first proposed, we made a commitment to do everything legally and reasonably possible to not "harm" local fishing communities. Concern was raised at a Downeast Lobstermen's Association meeting where it was suggested that release of detailed data and information from individual tows might result in economic loss to small Downeast fishing communities. The fear was that boats not from the area would take advantage of stock abundance knowledge to the detriment of the small communities.

Withholding publicly collected data on a publicly held resource is difficult to justify. At the same time, however, we cannot justify and do not condone harming local communities. We believe the Department has honored our commitment to downeast fishermen over the past two years.

Information from the trawl survey has been available in summary form but not by specific tows. We have had several requests for the raw data but in the spirit of our commitment we have not released it. In discussions with DELA and some individual lobstermen, it is now apparent that the concern over data release was really over lobsters.

Obviously, as time goes on, the data become less and less representative of conditions of the resource and therefore less valuable to "outsiders."

Therefore, the following policy was developed regarding the release of tow specific trawl data.

1. No data will be released to the general public until it has passed all Quality Assurance / Quality Control checks
2. Excepting #3 below, no tow specific data on lobsters will be released to the general public that is less than one year old.
3. Where management/policy/regulatory decisions may benefit, specific information may be released to decision makers upon written specific request. The request must justify why that information has bearing on the decision and how the information will be used, and who will have access to that information.

We believe that this balances the needs of small downeast communities and provides access to information on our publicly held and managed resources.